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INDEX.

VOLUME XV.

A	PAGE		PAGE
Agricultural and other Shows, 1910	130	Bees: Colony with Natal Fever, How to Treat	636
Agricultural Chemistry for Begin- ners. <i>See under C.</i>		Bees: Control of Swarms in Spring, By W. J. Fuller	631
Agricultural Machinery at Brussels Exhibition	416	Bees from Swarming, To Prevent	750
Agricultural Show, Royal: Annual Exhibition	49	Bees, Importation of, into the Transvaal	136
Agricultural Shows, The Value of	510	Bee, the Living, By Mary Ritchie, President, Natal Bee Keepers' Association: Natal Expert, S. A. Bee Keepers' Association 87, 229, 343, 445, 628, 745	745
Agricultural Union, Natal: Pro- ceedings of the Annual Con- ference	28	Bee Life: The Honey-Guide	666
Agricultural Union, South African: Annual Conference in Cape- town: Details of Proceedings	709	"Birds of Natal"	667
Agricultural Union, S.A.	573	Birds, Protecting	12
Agricultural Unions, Ours	679	Boats, Treatment of	522
Agriculture, Division of Forestry and: Notices. <i>In each Issue.</i>		Boiling Points	523
Agriculture, Motors in, By London M. Douglas, F.R.S.C.	442	Bordeaux Mixture, Making	366
Among the Farmers: The Associa- tions During the Month	637	Boys, Training Farm for	507
Ants, To Destroy	503	Breeding, Cross Suffolks for	208
Apples, Drying	108	Breeding Rules, Horse	279
Arab Stallion	278	Buildings for Agricultural Pur- poses, Round	362
Arsenic in Milk and Beef: Report to the Natal Board of Health	693	Butter-Makers, Hints for	396
		Butter-Making, The Faults of, By E. O. Chadlis	731
		Butter Points, Good	651
		Butter, Soft	272
B		C	
Bacon Curing in Brazil, By Lon- don M. Douglas	140	Cane Cultivation in Porto Rico . .	690
Bagasse, Paper from	511	Cane Fields, Humus for	9
Bamboo, Paper from the	15	Cane, Sugar, Culture: Effects of Soluble Manures	603
Bank, The Land	265	Cane, Sugar, Culture: Soil Wastes in Cane Field	469
Bark Wattle, Analyses of	188	Cane, Sugar, Deep Draining for . .	276
Beans, Depth for Planting	109	Cane, Sugar: Irrigation of the . .	7
Beef, Arsenic in Milk and: Report to the Natal Board of Health	693	Cane, Sugar: The Structure of: Its Influence on Mill Work in Factories	339
Bee Hives, Grubs in	371	Carrot Under Irrigation, The . . .	108
Bee-Keepers' Association, Natal: Monthly Notes and Comments, By W. J. Fuller	231, 635, 748	Cattle-Breeders, Some "Pont's" for	539
Bees and Fruit Fertilisation, By R. Beuhne	237	Cattle Buyers' Permits	277
		Cattle, Dairy: Their Types and Management, By E. S. Davies	698

	PAGE	Contributors (continued).	PAGE
Cattle-Dipping: An Ideal Cheap Dipping Outfit	624	Douglass, London M.—"Bacon-Curing in Brazil, 140; "Woburn Experimental Farm," 308; "Motors in Agriculture," 442.	
Cattle, Entry of, into Natal from Cape Province	136	Earls, W. F.—"South African Wool from a Buyer or Manufacturer's Point of View," 222.	
Cattle Hides and Skins into Free State. Introduction of	570	"Experience," "Preparing Poultry for Exhibition," 26.	
Cattle Weights by Measurement	369	Fortier Samuel—"Methods of Applying Water to Crops," 154.	
Cedara Agricultural Laboratory: Quarterly Report	188	Fuller, Claude—"Mealie Grubs," 426; "Peach Leaf Curl," 436; "Some Orders of Insects," 540, 768.	
Cedara. A Visit to. By A. E. Dixon, F.R.S.	743	Fuller, W. J. "The Control of Swarms in Spring," 631.	
Celery Culture: Some Hints on Earthing and Blanching	478	Hayter, C. S.—"Tree-Growing in the Zwaantkop Native Location," 460.	
Chameleon, The	665	Hockley, Dan.—"Sheep and Wool Judging," 19.	
Cheese, Cheddar, Influence of Lactic Acid on	211	Lely, L. G.—"Vinegar from Molasses," 484.	
Cheese, Cream; How to Make	398	Macdon, W. T.—"Strawberry Culture," 164.	
Cheese, Home-Made	422	McCall, Jas. J.—"The Growing and Preparation of Wool for the South African Market," 179.	
Cheese-Making Soft: A Good Use for Surplus Milk	397	Moore, R. A.—"Maize Judging," 98.	
Cheese Pitching	256	Moss, H.—"The Export of Maize," 703.	
Chemistry, Agricultural; for Beginners. By Archibald Pearce, 115, 246, 388.	763	Pearce, Archibald—"Agricultural Chemistry for Beginners," 115, 246, 388, 763.	
Chickens, Laid in	503	Pitchford, H. Watkins, F.R.C.V.S., F.R.S.E.—"Dipping and Tick-Destroying Agents: Second Report," 312; "Dipping and Tick-Destroying Agents," 577.	
Chickens off Long Grass, Keep	736	Pomus—"Fruit Culture: Some Chats for Beginners," 112, 243, 385, 537.	
Chickens, Onions for	360	Pope, C. A.—"The Judging of Shorthorns," 21.	
Chickens, Weakly	503	Ritchie, Mary—"The Living Bear," 87, 229, 343, 445, 628, 745.	
Chicory, The Cultivation of: An Experiment at the Winkel Spruit Experiment Farm	476	Southley, Chas.—"The Thoroughbred Horse in South Africa," 24.	
Chou Moellier, More about	647	Wayne, S.—"Poultry Keeping," 618, 737.	
Citrus Trees, Transplanting	752		
Cifton Park System of Farming	409		
Coal and Labour Return. <i>In each Issue.</i>			
Cold Stores and Abattoirs, Government: Charges. <i>In each Issue.</i>			
Comb, Foundation	573		
Commerce and Industries Commission	573		
Contributors—			
Barber, C. A.—"Notes on Irrigation," 391.			
Bergb. Max.—"Sluits: Their Prevention and Cure," 216.			
Benham, R.—"Bees and Fruit Fertilisation," 237.			
Challis, E. O.—"The Faults of Butter-Making," 731.			
Choles, H. J.—"Soy Beans: Their Cultivation and Uses: A New Natal Industry," 281.			
Davies, E. S.—"Dairy Cattle: Their Types and Management," 698.			
Deirborn, Nel.—"How to Destroy English Sparrows," 487.			
Dixon, A. E.—"A Visit to Cedara," 743.			
Dixon, Arthur—"Cotton-Growing on the Swart Fosi," 17.			
		Correspondence—	
		Fruit Export, Natal.—Karl Schwarz & Calder	
		Honey Exhibits at the Maritzburg Show.—W. J. Fuller	

	PAGE		PAGE
Correspondence (continued).		E	
Machines, Stone-Gathering.—R. Perkins	527	Earth-Nut Thresher	337, 567
Motor, The Midget. G. North & Son	377	East Coast Fever: Amended Report of Advisory Commission	54
Mule, The "Rosie Kop."—"Enquirer"	374	East Coast Fever: Cattle Buyers' Permits	277
Rot Crops and Fertilisers.—E. T. M. Burges	110	East Coast Fever: General Botha's Policy	220
Snake Bite Antidote. The "Zibiba." F. W. Fitzsimons	653	East Coast Fever: Ports of Entry on Cape-Natal Border	421
Soy Beans.—Geo. Carter & Co.	375	East Coast Fever. The Position of. <i>In each Issue.</i>	
Cotton and Ramie at Bulwana: What Mr. E. Löffler is doing	609	East Coast Fever Regulations . .	420
Cotton Crops, Method of Estimating	6	East Coast Fever: Restrictions of Entry of Certain Products into Free State	572
Cotton, Distance of Planting . . .	11	Education, Agricultural: Technical Knowledge and the Farmer . .	279
Cotton-Growing on the Swart Fokosi. By Arthur Dixon, F.G.S.	17	Egg Eaters, Soft Eggs and	359
Cover Crops	253	Eggs, How to Keep	361
Cow Houses, More Light in . . .	697	Eggs, Soft, and Egg Eaters . . .	359
Cow into Season, Bringing a Young	505	Employment Bureau. <i>In each Issue.</i>	
Cows, Dairy; Salt for	646	Engine Matters, Gasoline	642
Cream Cheese, How to Make . . .	398	Engine, Petro'; The "Samson" . .	334
Cream Separator, The "Ceres" . .	333	Ensilage, Maize	107
Cream Tests, Variations in . . .	512	Ensilage, What is?	766
Cropping, Continuous	371	Entomological Research. A Bulletin of	685
Cover Crops and Clean Weeding .	513	Entomology and Horticulture, Division of: Seventh Report: Review of the year 1909-10	89
Crops, Cover	253	Exchange Reviews: What Others are Thinking and Doing. <i>In each Issue.</i>	
Crops, Methods of Applying Water to. By Samuel Fortier	154	Excursions, Notes of	761
Cultivation, Clean	648	Executives of Farmers' Associations	559
		Exercise for Stock, Need for . . .	651
D		Experiment Station, Value of the	506
Dairy Cattle: Their Types and Management. By E. S. Davies	698		
Dairy Notes	250	F	
Dairy Utensils	751	Farm Apprentices' Bureau. <i>In each Issue.</i>	
"Day and Night"	534	Farmer Boys' Pages. <i>In each Issue.</i>	
Dipping and Tick-Destroying Agents. By H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E. . . .	577	Farmers, Among the: The Associations during the Month	492
Dipping and Tick-Destroying Agents: Second Report. By H. Watkins-Pitchford	312	Farmer, Technical Knowledge and the	279
Dipping, Cattle: An Ideal Cheap Dipping Outfit	624	Farm for Boys, Training	507
Dipping, Compulsory; in Richmond Division	10	Farming Progress in Natal	681
Dipping, Mr. Pitchford's Second Report on	277	Farming, System of: The Clifton Park	409
Dips for Pigs	211	Fertilisation	372
Dips, Sheep: Some Leading Prescriptions	395	Fertilisers, Analyses of	189
Dips, Testing Strength of Aseptic Dip, The Laboratory (Formula) .	138	Fertilising Influence of Sunlight .	614
Draining for Sugar-Cane, Deep . .	276	Fibre Machinery: The Burn Machine	366
Ducklings with Sunstroke	311	Figures for Farmers: Useful Facts, Tables, and Formulae	368
Dundee Agricultural Society: Annual Meeting	637	Flowers, Veld	533
		Food, Spitting	505
		Food Values	509

	PAGE
Forestry Reports for May and June	191
Forgan's Stone-Gathering Machine	685
Fowl, Age of a: To Judge	252
Fowls, Killing	254
Fowls, Puckling	209
Fowls, Roup in	505
Fruit Culture: Some Chats for Beginners. By Pomus 112, 243, 385, 537	
Fruit, etc., Moss Packing for, to Cape	277
Fruit Export	11
Fruit, Export Rates on Grain and Fruit Fertilisation, Bees and. By R. Bouhne	237
Fruits and Meat in London, South African Citrus	346
Fruits, Water Supply for Citrus ..	52
Fruit, Thinning	520

G

Gardening, Joys of	534
Garden Manures	373
Garden, Merchiston School	759
Gardens, School; Suggestions Regarding	664
Garden, The College	757
Gasoline Engine Matters	642
Grain and Fruit, Export Rates on ..	137
Grain, Kiln-Dried	594
Grass, Laying Down Land to	409
Grit and Shell-Making Material ..	255
Grubs, Mealie. By Claude Fuller, F.E.S.	426

H

Hay Harvesting Machinery: Some Notes by an Expert	748
Hay Stack, To Measure a	525
Heifer with Snore	504
Hens, Forced Moulting of	683
Herd Building	360
Hides and Skins into Free State. Introduction of	571
Hides for Export, Treatment of ..	568
Honey at the Maritzburg Show: Judge's Report	232
Horse-Breeding Rules	279
Horses, Diseases of the	278
Horse Notes	396, 545
Horses, Arab Stallion	278
Horses, Early Training of	640
Horses: Food Spitting	505
Horses, Regarding: Good and Bad Stable Management	453
Horses, Strangles in	602
Horses' Teeth	361
Horses, When to Water	617
Horse, The Morgan	687
Horses, Thoroughbred, in South Africa. By Chas. Southey, C.M.G.	24

	PAGE
Horticulture, Division of Entomology and: Seventh Report: Review of the year 1909-10	59
Humus for Cane Fields	9
Hydraulic Units, Table of Equivalent	525

I

Incubation, Cooling in	107
Insects, Some Orders of. By Claude Fuller	540, 768
Insurance, Live Stock: How to Form Mutual Insurance Clubs ..	149
Irrigating Orchards	522
Irrigation Does, What	58
Irrigation: Methods of Applying Water to Crops. By Samuel Fortier	154
Irrigation, Notes on: The Use and Abuse of Water for Plants. By C. A. Barber	391
Irrigation, The Carrot Under	108
Irrigation: Water Supply for Citrus Fruits	521

J

"Jackie Hangman"	532, 669
Judging Maize. By R. A. Moore ..	98
Judging of Maize, Selection and. By M. J. Joubert, B.S.A.	439
Judging of Shorthorns, The. By C. A. Pope	21
Judging, Sheep and Wool. By Dan Hockley	19

K

Kafir Corn, Export of Maize and: New Regulations for Grading ..	481
Kafir Corn, Planting	109
Knowledge and the Farmer, Technical	279

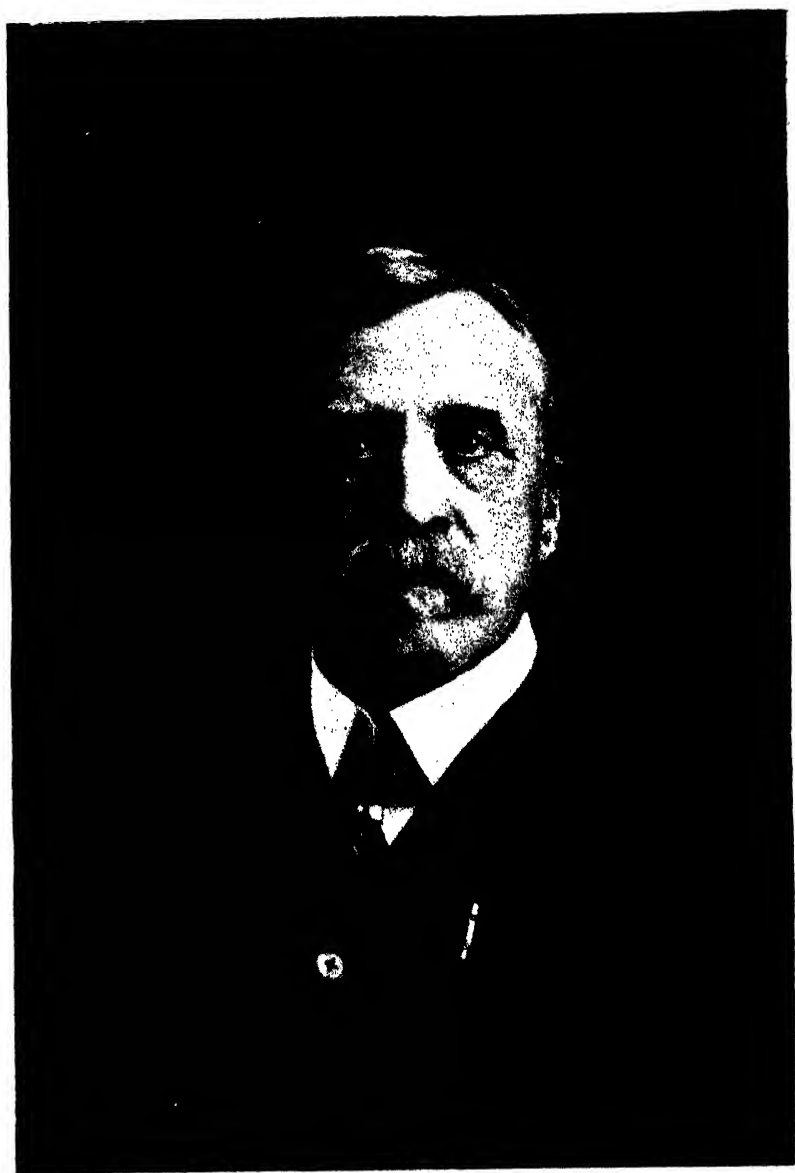
L

Laboratory, Cedara Agricultural: Quarterly Report	188
Laboratory Dip, The (Formula) ..	138
Lactic Acid on Cheddar Cheese, Influence of	211
Lambs, Roots and Maize Silage for ..	212
Lambs, Stomach Worms in	503
Land Bank, The	365
Legume, A New	522
Lice in Chickens	503
Lime Stone, Analyses of	189
Live Stock Insurance: How to Form Mutual Insurance Clubs ..	149
Lucerne, Irrigating	751
Lungsickness and Scab, Farms under License for. In each Issue.	

	PAGE		PAGE
M		Motor, The "Midget"	14
Machinery at Brussels Exhibition, Agricultural	416	Mulches Soil	521
Machinery Enterprise, Further	272	Mustard for Poultry	274
Machinery for Farmers, New: Further Notes for the Present Season	612	N	
Machinery for Farmers, New: Notes for the Coming Season	330	Natal Agricultural Union. <i>See</i> "Agricultural Union, Natal."	
Machinery, Hay Harvesting: Some Notes by an Expert	348	Natal Bee-Keepers' Association: Monthly Notes and Comments. <i>In each Issue.</i>	
Machinery, Sheep Shearing by	135	Natal Poultry Club: Annual Meeting	495
Machines, Stone-Gathering	207	Nature Notes. <i>In each Issue from August.</i>	
Maize and Kafir Corn, Export of: New Regulations for Grading	481	Nature Study in South Africa	603
Maize Competition	277	Nature, The Voices of	756
Maize Crop in May, The	4	Nest, Clean	367
Maize Enslage	107	Netting Sheep	523
Maize, Judging. <i>By</i> R. A. Moore	98	New Hanover Agricultural Association: Annual Meeting	500
Maize, Methods of Sowing	509	Notes and Comments. <i>In each Issue.</i>	
Maize Samples, Preparation of	274	O	
Maize Season, The End of the	133	Onions for Chickens	369
Maize, Selection and Judging of. <i>By</i> M. J. Joubert, B.S.A.	439	Opportunity, Oar	1
Maize Silage for Lambs, Roots and	212	Orange, The Split of the	507
Maize, The Export of. <i>By</i> H. Moss	703	Orange Wine	13
Manure, Liquid	418	Orchards, Irrigating	522
Manure, Liquid, for Intensive Cultivation	508	Ostriches in Queensland	270
Manure, Pumping Liquid	210	Ostrich Farming: An Instructive Lecture	455
Manures Affect Soils, How	362	Ostrich Feather Show, An	278
Manures, Garden	373	P	
Manuring Experiments, Wheat	210	Paper from Bagasse	511
Manuring Green	752	Paper from the Bamboo	15
Manuring, The Principles of	119, 249, 382, 535, 662, 767	Peach Leaf Cure. <i>By</i> Claude Fuller, F.E.S.	436
Mare is in Foal, When a	708	Pear as a Fodder Plant, Prickly	539
Mealie Grubs. <i>By</i> Claude Fuller, F.E.S.	426	Petrol Engine, The "Samson"	334
Mealie Planters	613	Pig-Raising, Considerations in	687
Mealies. <i>See</i> Maize.		Pigs, Dips for	211
Meat in London, South African Citrus Fruits and	346	Pigs for Small Farmers	394
Meteorological Returns. <i>In each Issue.</i>		Pigs, Rations for	208
Milk and Beef, Arsenic in: Report of the Natal Board of Health	693	Pigs, Ringing	641
Milk, Analysis of Separated	368	Pigsty, Arrangement of	640
Milk, Home Pasteurisation of	686	Pineapple Experiments	684
Milking, Learning	602	"Pitching"	256
Milk Records, Value of	138	Plantations, Thinning	254
Milk, Temperatures for the Treatment of	524	Plan to Scale, How to Draw a	760
Molasses, Vinegar from. <i>By</i> L. G. Lelsy	484	Plants per Acre, To Find the Number of	524
Moss Packing for Fruit, etc., to the Cape	277	Plants, The Food of	118
Motors for South Africa, Commercial: Mr. Deane's Visit to England	213	Poppies, Transplanting	760
Motors in Agriculture. <i>By</i> Loudon M. Douglas, F.R.S.E.	442	Potato Starch in Germany	645
		Poultry: Clean Nests	267
		Poultry, Fledging	107
		Poultry Feeds, Weights of	369

	PAGE		PAGE
Poultry for Exhibition, Preparing.		Sheep, Overstocking	372
By Experience	26	Sheep, Salt for	270
Poultry, Fresh Air for	639	Sheep, Salt for; Need of	122
Poultry-Keeper, "Dont's" for	514, 753	Sheep-Shearing by Machinery	135
Poultry-Keeping, By S. Wayne	618, 737	Shell-Making Material, Grit and	255
Poultry, Mustard for	274	Sheep Yard, a Plan of a	16
Poultry Notes	122, 252, 393, 545, 774	Shipping Rates on Grain and Fruit	137
Poultry, Rheumatic Troubles of	364	Shorthorns, The Judging of. By C. A. Pope	21
Poultry, Vigorous Breeding Stock in	648	shows. See "Agricultural Shows."	
Pound Notices. In each Issue.		Silage for Lambs, Roots and Maize	212
Publications Issued by Department	554	Silo, Round; To Find the Content of a	523
Pumping Liquid Manure	210	Siphon, Value of the	108
		Skin Disease	504
R		Sluits: Their Prevention and Cure. By Max Bergh	216
Ramie at Bulwana, Cotton and: What Mr. E. Löffler is Doing	609	Soil Fertility, The Causes of	563
Ramie "Wool"	423	Soil Mulches	521
Rates per Pound, Cwt., and Ton, Table Showing Equivalent	368	Soil, Retentiveness of the	650
Rats, Destruction of	425	Soils, Analyses of	188
Reckoner Ready: Table of Equivalent Rates per lb., cwt., and ton	368	Soils, How Manures Affect	362
Reckoner Ready: To turn cwt., and qrs. into lbs.	524	Sows, Rare Profits from	269
Reviews, Exchange: What Others are Thinking and Doing. In each Issue.		Sow, The Motherley	374
Reviews of Books	515	Soy-B an Cake, Feed Value of	690
Rhodesia, Farming Progress in	416	Soy Beans: Their Cultivation and Uses: A New Natal Industry. By H. J. Choies	281
Roots and Maize Slage for Lambs Roup in Fowls	505	Soy Bean Thresher	567
Royal Agricultural Society and R.A. Show. See under A.		Sparrows, How to Destroy English. By Ned Dearborn	487
Rubber, Analyses of	189	Spray Pen, Natal; An Opinion of the	692
		Spring in Natal	533
S		Spring Studies	381, 529, 661, 762
S.A. Agricultural Union. See under A.		Stable Management, Good and Bad	453
Salt for Dairy Cows	646	Starch, Potato, in Germany	645
Salt for Sheep	270	Stock, Live; Insurance of	149
Salt for Sheep, Need of	122	Stone-Gathering Machines	207
Science and the Farmer: Notes of Interest by Farming Experts. In each Issue.		Stone-Gathering Machine, Forgan's	685
"Scorching"	372	Strawberry Culture. By W. T. Macoun	164
Separator, The "Ceres"	333	Students, Tests for: Some Useful Questions and Answers	120
Shearing Sheep by Machinery	135	Suet, Preserving	503
Sheep	255	Suffolks for Cross Breeding	208
Sheep and their Teeth	251	Sugar Cane. See "Cane, Sugar."	
Sheep and Wool Judging. By Dan Hockley	19	Sugar Manufacture for "Small Men"	273
Sheep Dips: Some Leading Prescriptions	395	Sunflower Farm, A	508
Sheep into Natal, Introduction of	569	Sunlight, Fertilising Influence of	644
Sheep into Orange Free State, Introduction of	509	Sunstroke, Ducklings with	311
Sheep Netting	523	Swine, Inter-Provincial Movement of	690
Sheep Notes	544, 669	System of Farming, The Clifton Park	409
		T	
		Teeth, Horses	361
		Tests for Students: Some Useful Questions and Answers	120

	PAGE		PAGE
Texas Fever Tick. Exterminating the	360	Vanilla Culture	15
Thermometer, The	254	Veld Flowers	533
Thresher, Earhnut	337	Vinegar from Molasses. By L. G. Lelsy	484
Tick Bird, Destruction of the	228		
Tick-Destroying Agents. Dipping and. By H. Watkins-Pitchford. F.R.C.V.S., F.R.S.E.	577	W	
Tick-Destroying Agents. Dipping and: Second Report. By H. Watkins-Pitchford	312	Water Supply for Citrus Fruits	521
Tick, Exterminating the Texas Fever	363	Water Table, The	373
Ticks, Eradication of: An Experiment with the Starvation Method	196	Water to Crops, Methods of Applying. By Samuel Fortier	154
Timber Measuring	370	"Water Witchery"	650
Tractors for Transport Purposes. Government	416	Wattle Bark. <i>See under Bark.</i>	
Transport. Government Traction	691	Wattle Wood. Utilisation of Waste: Interesting Reports from London	605
Transport Purposes. Government Tractors for	416	Weeding, Cover Crops and Clean Weeding, The Value of	364
Tree-Growing in the Zwaartkop Native Location. By C. S. Hayter	460	Weeds. Best Time to Kill	649
Tree-Planting Competitions, Natal: Some Interesting Correspondence	92	Wheat-Growing: A New Discovery	688
Trees for Transplanting. Pruning Trees, On the Planting of	367	Wheat Manuring Experiments	210
Turkey Breeding for Farmers: Some Useful Hints	350	Wheat, When to Cut	503
Turkeys, Feeding	521	Whitewash, Recipe for	611
Turkeys for Killing, Catching	649	Wine, Orange	13
Turkeys, Killing	256	Woburn Experimental Farm. By Loudon M. Douglas	308
		Wool for the South African Market, The Growing and Preparation of. By Jas. J. McCall	179
		Wool from a Buyer or Manufacturer's Point of View: South African. By W. F. Earle	222
		Wool Industry, Expansion of the Wool Judging, Sheep and. By Dan Hockley	19
		"Wool." Ramie	423
		Wool, Storing	642
		Wool Weight	368
		Worms in Lambs, Stomach	503



Mr. Jas. King.

The President of the Royal Agricultural Society of Natal, whose Annual Exhibition was held in June.

The Natal Agricultural Journal.

Our Opportunity.

THOSE of our readers who have been following the reports which we have published each month on the progress or otherwise made by the mealie crop since the beginning of the season will have noticed how the general condition of the crop has gradually fallen off until, according to our latest reports, the promise is for a crop averaging not more than four muids to the acre, taking the Province as a whole. This falling off has been due to various causes which we have already remarked upon in previous articles, and there is no need to recount them on the present occasion. The fact remains that whatever the causes, a lower average yield per acre will be secured by farmers this season than they obtained last year. The yield, according to latest reports, is, as we have just said, not likely to average more than four muids to the acre, and we shall not be in the least surprised if the actual yield, when reaping is over, is found to be appreciably less than four muids on account of the adverse influence upon the crop by frosts on those farms where planting could not be done until late in the season. A comparison of the present season with last season affords an interesting object lesson on the folly of "putting all one's eggs into one basket." Certainly very few of our farmers are foolish enough to stake all their hopes on one crop, but at the same time on a very large number of farms in mealie-growing districts maize forms the staple crop; if the mealies fail or do not come up to the average the total income of the farm is much smaller than if any other crop should prove disappointing. The significance of this is brought out particularly well by the comparison of the present season with the last which we have suggested. The same acreage has been put under mealies in both seasons, but whereas last year we obtained a crop of 800,000 muids, this year we are likely to obtain not more than about 650,000 muids, and if the crop turns out to be 600,000 only we shall not be surprised. Here we see a probability of a loss of perhaps as much as 200,000 muids to the country—that is to say, from 150,000 to 200,000 muids less available for export purposes. Those acquainted with the importance of the export trade to the country will realise what this means. But this loss affects farmers more closely than at first thought may seem

apparent. It is not the same as if a smaller area had been planted—say, some 150,000 acres less than last year. In such case we should be merely failing to realise to a certain extent our possibilities in the matter of mealie growing. But it is more than this. The full 165,000 acres that were planted with mealies this season have been cultivated and have to be cultivated as if there were no possibility of a smaller yield than that of last year—in fact, if there is any difference, there must be more cultivation, in order to try and increase the yield a little at any rate. This means that an area which last season yielded a crop of 800,000 muids has this year to have as much money and labour spent on its seeding and cultivation, although it will yield quite 150,000 muids less—the total returns, that is to say, will be less than they should have been by the value of 150,000 muids.

All this points to a moral—a moral which, times without number, has before been drawn from other and similar cases—and it happens that the occasion for drawing this moral is timed most opportunely. What this moral is we have already hinted at. We have remarked on the folly of putting all one's eggs in one basket, and whilst, as we have said, very few farmers grow mealies only and rely solely upon them for their income, at the same time on most farms in the mealie-growing areas, this crop forms the principal source of income. It is a sound principle in investment not to sink all one's capital into one venture, but to distribute it over as many concerns as conveniently may be, and the reasons are obvious. In the same way it would be wisdom on the part of the farmer not to sink all or even the major portion of his time, labour, and money into one crop or branch of live stock; instead of having one main crop, choose rather three or four. It is very rare that every crop on a farm fails, and where a farmer has gone in for three or four "main crops" failure on the part of all of them—even supposing such a remote likelihood—will make him no worse off than if he had had one main crop only. What particular crops should be chosen for the purpose depends upon the district, and, of course, it goes without saying that there must be a constant and reliable market for every one of the crops chosen.

It has been with this idea in mind that we have from time to time in the past drawn attention to various crops suitable for Natal, or at least worth trying, and a reference to back numbers of the *Journal* will show that the list of crops thus referred to is no small one. Among these crops readers will remember at least two oil-bearing plants which succeed in this country, namely, the soy (or soya) bean and the earthnut. These two crops have been proved to do well in Natal, and it has only been the question of a market for their products which has prevented their being grown on anything like a large scale. In referring to these two crops in particular we have in mind a potentiality of no

mean order which Natal possesses and which during the last few months has grown to very considerable dimensions—namely, as a grower of oil-yielding products. Among the oil-yielding plants of commerce the earthnut and the soy bean occupy now an important place, and already the Department of Agriculture has been informed by one Durban gentleman alone that his principals in London are in a position to take thousands of tons of soy beans annually from Natal. This is only one outlet; unofficially we have heard of others in Durban which are likely to prove equally extensive. At the present moment we know of at least three large factories in Durban which are in a position to take large quantities of oil-bearing products from our farms, apart from soy beans, for which, as we have just said, there is a large market at our very doors.

The cultivation of oil-yielding crops, then, is one of the directions in which we think farmers would do well to turn their energies, in order not to have too much at stake in their mealie crop. For the present we do not propose to do any more than refer to the possibilities which exist in this direction. We wished, in the first place, to draw attention, as we have done, to the folly of placing too much reliance in one crop, whether it be mealies or anything else, and to advise farmers to look around for other crops for which there may be a ready market, and then to point out that a good local market exists for oil-yielding crops, a market which should be taken advantage of. We shall be visiting Durban shortly—on the occasion of the Show—when we propose to gather together all the information available as to the extent of the market which really exists for oil-yielding products, the kinds of crops which farmers should grow, approximately how many tons annually can be disposed of in Durban in each case, what price the purchasers are willing to pay, and so on; and all this information we propose to publish in the next or the following issue of the *Journal*. With all the information available thus consolidated it will then be possible for any farmer to decide which crops it will pay him best to grow. Finally, we shall prepare and publish in the *Journal* articles on the cultivation of all the various oil-yielding plants which we have not already referred to in back issue.

Serenity, undisturbed by fretful restlessness, is a characteristic of a good brood sow. Any breeder of experience will know just what is meant when it is said that a sow is “motherly,” but the exact meaning is difficult to set down in words. This maternal manifestation has an important bearing on success with a litter, and the dam’s promise in this regard should have weight in her purchase.

The Maize Crop in May.

PROBABLE CROP—660,000 MUIDS.

IN our last issue we had to note a further decline in the condition of the crop—from 2·38 at the end of March to 2·27 at the end of April. During the month we issued an *interim* report to the daily press, in which we stated that, according to reports which had so far come to hand, the condition of the crop at the end of May was 2·35, corresponding to an average yield per acre over the whole Province of 4·1 muids. Since that report was published further returns have come in, and we now estimate the condition of the crop on May 31st to have been 2·32, which represents an average yield of 4 muids. This represents a crop of 660,000 muids, or a little more than we estimated in our last issue.

In the following statement the probable total crop, according to conditions at the end of each month of the season, is given, for 1910 and 1909, for purposes of comparison. It will be seen that we are a long way off last year's crop:—

				Probable crop—	
At End of—				1910 Muids	1909 Muids
January	...	...	...	570,000	886,000
February	...	...	...	720,000	856,000
March	...	...	...	675,000	770,000
April	...	...	...	645,000	770,000
May	...	...	...	660,000	750,000
June	...	...	...	-	800,000

The following figures show how the crop this season compares with that of last year, as regards condition and consequent probable yield per acre. We give last year's figures for June 30th also, in order that readers may see what condition our crop has to arrive at before the possibility of last year's yield is attained:—

				1910		1909	
At End of—				Condition	Yield	Condition	Yield
January	...	...	...	2'0	3'44	3'1	5'34
February	...	...	...	2'52	4'34	3'0	5'16
March	...	...	...	2'38	4'1	2'69	4'63
April	...	...	...	2'27	3'91	2'7	4'65
May	...	...	...	2'32	4'0	2'64	4'54
June	...	...	...	...	...	2'82	4'86

Appended will be found a table showing the progress or otherwise that the mealie crop is making in the various Magisterial Divisions of the Province. In studying these figures it should be remembered that the four "conditions," "poor," "fair," "average," and "above the average," are represented by the figures 1, 2, 3 and 4, respectively, and that intermediate figures represent intermediate conditions.

THE MAIZE CROP IN MAY.

55

CONDITION OF CROP.

(Note.—A condition "above the average" is represented by the figure 4; "average" by the figure 3; "fair" by the figure 2; and "poor" by the figure 1; intermediate figures represent corresponding conditions.)

Division	Condition of Crop at end of —				
	January	February	March	April	May
Lower Umzimkulu ...	3·2	3·0	3·0	1·50	2·0
Alexandra ...	2·5	2·7	2·4	2·60	2·4
Umlazi ...	2·0	2·0	2·0	2·0	2·0
Inanda and Indwedwe ...	3·2	3·0	3·4	3·0	3·25
Lower Tugela and Mapumulo ...	2·4	2·5	2·5	2·50	2·5
Impendhle ...	1·0	1·2	2·0	1·50	2·0
Alfred ...	2·5	3·0	2·5	1·67	2·4
Ixopo ...	2·7	2·7	2·8	2·5	2·7
Richmond ...	2·2	2·4	2·4	2·26	2·6
Umgeni ...	2·4	2·4	2·1	2·14	2·0
New Hanover ...	2·4	2·4	2·4	2·59	2·8
Lion's River ...	1·8	1·8	2·3	1·82	2·0
Unyoti ...	2·2	2·5	2·5	2·29	2·2
Krantzkop ...	2·8	2·8	3·0	2·75	2·7
Underberg ...	1·0	1·0	3·0	1·0	...
Polela ...	1·0	2·0	1·5	2·0	2·3
Bergville ...	1·8	2·6	2·8	2·75	2·5
Estcourt ...	1·9	2·3	2·2	2·15	2·2
Weenen ...	1·6	2·0	1·7	1·67	2·0
Klip River ...	2·0	2·2	2·1	1·79	2·2
Umsinga ...	2·6	2·0	2·3	2·0	2·0
Dundee ...	2·2	2·5	2·8	—	2·3
Newcastle ...	2·2	2·4	2·4	2·0	2·1
Vryheid and Ngotshe ...	2·6	3·2	2·3	3·0	2·4
Utrecht ...	2·5	2·3	2·0	2·0	1·7
Paulpietersburg ...	4·0	3·4	2·5	4·25	2·7
Babanango ...	3·0	3·0	2·0	1·0	...
Eshowe and Mtunzini ...	2·5	3·0	2·0	2·0	2·5
Emtonjaneni ...	3·0	2·8	2·6	2·67	2·4

The young horses that are to be used in harness for the first time should be handled very gently and loaded very lightly until they become somewhat used to the work and the muscles become hardened so as to be able to withstand the strain of heavy pulling. Many young horses are injured by being crowded into heavy work too suddenly, and not gradually seasoned to heavy usage as they may be.

Work horses need a bath every twenty-four hours or oftener. But the "bath" needn't be given with soap and water in a tub; it can be administered with a curry-comb and brush in the barn. If you allow the minute pores of a horse's skin to get clogged with dried perspiration, both the skin and the general system of the animal become diseased.

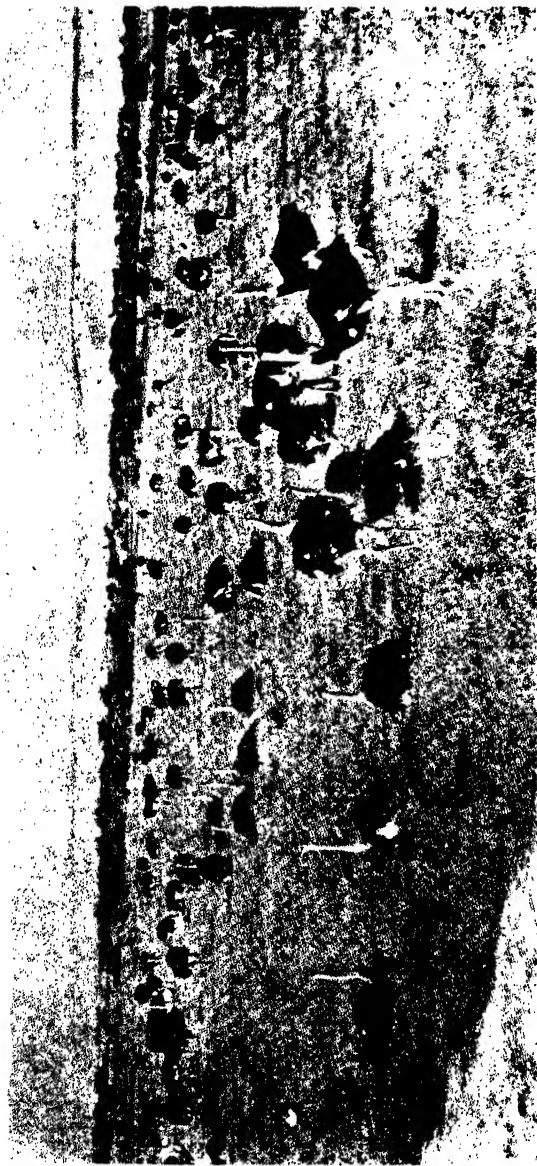


To Our Readers.

WITH this issue a change is made in the method of dating the *Journal*, in order to bring it into line with other and similar journals. Henceforth the name of the month which the *Journal* will bear will be that of the month at the beginning of which the *Journal* is issued, instead of, as heretofore, the month at the *end* of which it appears. Thus the present number, published at the beginning of July, is designated the *July* issue, instead of the *June* issue as under the old system. The present issue consequently begins a new volume—Vol. XV.—and the index for the last volume is being issued with the present number. Another innovation which we shall make forthwith will be to present our readers with a report on the weather and crop conditions of the Province as on the 15th of each month, instead of in respect of the calendar month as before. Thus the “weather and crop” article in the August number (published at the beginning of the month) will be based on reports received in respect of conditions during the month ending the 15th July. Next season, also, we shall issue our maize crop reports on the same basis. These changes will, we think, meet with the approval of all our readers; and if there are any further desirable alterations which might be made, which may occur to our readers, we shall be glad to receive suggestions.

Method of Estimating Cotton Crops.

Mr. J. C. Crawford, Special Agent attached to the United States Bureau of Entomology, has elaborated the following directions for estimating the yield of cotton from the plants in the field—hints which will doubtless be found useful to those of our readers who are engaged in cotton cultivation. Determine the average number of sound bolls per plant, Mr. Crawford says, by counting the number of such bolls on some five adjacent plants in at least three separate places in the field, and dividing the total number of bolls counted in this manner by the total number of plants examined. Where the field is very large or contains



THE DAWN OF A NEW INDUSTRY.

A Glimpse of a Cape Ostrich Farm.

different soils, more than three places should be selected for counting. In the first column of the following table find the distance between the plants in the field, the crop of which is to be estimated. Then refer to the number on the same line in the following column, headed by the size of bolls to which the variety planted belongs. Dividing the average number of bolls per plant in the field by the number found in this manner in the table will give the fraction of a bale per acre that will be produced. In using this table, due allowance must be made for a poor stand.

Table showing number of cotton bolls per plant of various classes required at certain distances to produce a bale per acre when cotton gives 33 1-3rd per cent. of lint:—

Distance between Plants in feet.	Number of Plants per acre.	Large Bolls, 50 to 65, per lb.	Medium sized Boll, 70 to 80 per lb.	Small Bolls, 86 to 100, per lb.
1 x 3	14,520	5.9	7.7	9.5
1 x 4	10,890	7.9	10.8	12.7
1 x 5	8,712	9.8	12.9	15.9
1 x 6	7,260	11.8	15.4	19.1
1½ x 3	9,680	8.9	11.6	14.0
1½ x 4	7,260	11.8	15.4	19.1
1½ x 5	5,808	14.8	19.3	23.8
1½ x 6	4,840	17.8	23.2	28.6
2 x 2	10,890	7.9	10.3	12.7
2 x 3	7,260	11.8	15.4	19.1
2 x 4	5,445	15.8	20.6	25.4
2 x 5	4,340	19.7	25.8	31.8
2 x 6	3,630	23.2	30.9	38.4
3 x 3	4,840	17.8	23.2	28.6

Example.—If, in the case of a small-boll variety like the "King," the average number of bolls per plant is found to be 10, and the plants are put in at a distance of 2 feet in rows, 4 feet apart, the amount of the prospective yield per acre will be 10 divided by 25.4 or 0.39 of a bale.

Irrigation of the Sugar Cane.

In recent issues of the *Louisiana Planter and Sugar Manufacturer* Mr. Jesse H. Buffum has been contributing some interesting articles on the sugar industry of Hawaii, and in a late number of that journal he deals with the question of irrigation as applied to the cane crop. It appears that, when the growing of sugar cane was first started in the Hawaiian Islands, the planting was done on the windward slopes, to get the benefit of the rainfall, on which crops alone depended. As the industry grew and experience taught the planter to study natural as well as prospective conditions, it became apparent, only a few years after the

inception of the business, that rainfall alone was not sufficient for the needs of the cane. Rainfall, with a very few exceptions as to limited districts, was so irregular as to prove an element of great uncertainty in cane culture. So, early attempts were made at irrigation. Streams were dammed up and their waters diverted, short distances, to the heads of cane fields. By successful experiments the Hawaiian planters were early taught the virtues of irrigation; and their experiments were almost always successful.

So great has been the influence of irrigation upon sugar cane culture in the Hawaiian Islands that, in Mr. Buffum's own words, "the difference between the irrigated and the non-irrigated plantations spells the story of sugar success" there. As regards ratoons at least, water is first applied as soon as harvest is done and the labourers have gone over the field and leveled up the surface and stuck in new plantings wherever ratoons can not be expected to appear—wherever the parent stalk has been destroyed or uprooted. From that point of "irrigating-up," water is applied almost continually to within a month, perhaps, of cutting: this where rainfall is not counted on. In former days, rainfall produced fair crops; but fair crops would not suffice; and irrigation was the key that unlocked the door of real opportunity.

That the substantial growth of the sugar industry in the Hawaiian Islands has been coincident with the expansion of irrigation is strikingly shown by the following interesting figures, which give the average yield of sugar per acre from the irrigated and non-irrigated plantations respectively during the years 1895-1906:—

Year.	Sugar Yield per Acre in lbs.							
	Non-irrigated Plantations.				Irrigated Plantations.			
1895	7,669
1896	9,032
1897	10,151
1898	11,260
1899	12,157
1900	12,254
1901	12,388
1902	11,681
1903	12,377
1904	11,212
1905	12,156
1906	11,526

In 1895, the total area of non-irrigated plantations was 23,945 acres.

of irrigated plantations 23,454 acres. In 1906 there were 46,117 acres of sugar cane growing without irrigation and 50,112 acres of imported sugar lands.

Humus for Cane Fields.

Humus has been spoken of as "perhaps the most important constituent of a fertile soil, as it influences chemical and physical properties of the soil." Its presence improves the mechanical condition of the soil, aerating it, and retaining its moisture for a much longer period than where humus is deficient in quantity. Land with plenty of humus in it never becomes so dry and hard in dry weather, nor so sodden in wet weather, as where this element is lacking. How to maintain the supply of humus has therefore been a much discussed problem amongst all thoughtful cane growers. The *Australian Sugar Journal* discusses this subject in its bearing on cane-growing, in a recent issue; and after pointing out what is, of course, the obvious solution to the question—namely, to restore to the soil that what had been taken from it in the form of cane tops and trash—but which it has hitherto been found impossible to deal with satisfactorily for the purpose in view owing to their being of so bulky a nature, the Editor of the *Journal* goes on to say that his attention has recently been directed to a system which gives promise of surmounting the difficulties in a practical and effective manner. An illustration in the same issue of the journal shows a portable gas engine and chaff cutter combined, which can either be drawn about the field by a pair of horses, or can be made self-propelling. This machine is made in two sizes, the smaller of which is calculated to chaff from 50 to 70 tons per day, whilst the larger would deal with from 80 to 100 tons of trash and tops in the same time. The labour required would be two lads gathering and one feeding with the smaller machine, and three gathering and one feeding with the larger. It is pointed out that in districts where horse flesh is any consideration, one of these machines can be put in for the cost of four good horses, and it can be used not only for chaffing but also for pumping, sawing wood, and other operations on the farm for which power is required. This machine has been devised by the Brisbane agents of the Pitt oil engine—Messrs. Foggitt, Jones & Co.—to whom the necessities of the case was explained; and patents have been applied for.

As our contemporary remarks, it is scarcely necessary to explain to practical men that once the trash and tops are cut into chaff of $\frac{3}{4}$ in. to 1 in. in length, it will be a simple matter to secure its absorption in the soil. It could either be ploughed in during the operation of "ratooning," or even by means of the Planet Junior cultivator, as the short length of the material would not offer any obstacle to the working of an implement.

At the same time, the dew and moisture of the soil would have access to a greatly increased surface, so that the process of decay would be greatly assisted, even with those fragments that escaped absolute burial in the soil.

Compulsory Dipping in Richmond Division.

In a Government Notice (No. 325, 1910), dated the 30th May, the late Acting Minister of Agriculture ordered, under the powers conferred on him by Section 4 of Act No. 20, 1910, that, from and after the 1st July, all cattle within the Magistral Division of Richmond shall be dipped or cleansed at such time or times and in such manner as is set forth in certain rules laid down in the Notice in question. The rules are as follows:—(1) The following terms shall have the meanings attached to them in this section, namely:—“*Inspectors*” shall mean the officers appointed by the Government for the purpose of supervising the dipping or cleansing, or other officers engaged in similar duties. “*Owner*” shall include the actual owner of the cattle and anyone having the charge or control of the cattle. “*Chief Veterinary Surgeon*” shall include the Principal Veterinary Officer in Natal, by whatever title his office may be known.

(2) Every owner of cattle within the Division shall, at successive intervals of not more than ten days, dip, spray, or dress all cattle whereof he is the owner or has charge or control in such manner as to on each occasion remove all ticks which may be upon the said cattle. (3) For dipping or spraying he shall use Laboratory Dip or any other preparation approved by the Chief Veterinary Surgeon. (4) For dressing he shall use either (1) Laboratory Dip or any other preparation approved of by the Chief Veterinary Surgeon, or (2) Cylin mixed with oil or grease, or (3) Stockholm tar and oil. (5) The owner shall not use any dip, spray, or dressing unless the same has been properly mixed. (6) Inspections will be made of all cattle at least once a month and cattle-owners and any person on whose land cattle may be shall give the Inspectors every facility for carrying out their duties of inspections.

(7) If from the condition of any cattle an Inspector is of opinion that any of the provisions of this order have not been properly carried out, or that further dipping, spraying, or dressing is necessary, he shall have authority to require the owner to dip, spray, or dress to his satisfaction the said cattle in such manner and at such intervals as he may direct, and the owner shall carry out the instructions of the said Inspector. If the Inspector deem it necessary he may himself carry out the work at the cost of the owner of the cattle and the owner or the person on

whose land the cattle may be shall give the Inspector such help with labour or otherwise as he may require. (8) This order shall extend to Native Locations and Mission Lands lying within the Richmond Division. (9) This order shall take effect from and after the 1st day of July, 1910. (10) The Chief Veterinary Surgeon shall have power, upon receiving a representation from not less than twelve cattle-owners in the Division or in any district in the Division that, owing to the severity of the winter, dipping cannot be safely carried out as required by this order, and after satisfying himself that such is the case, to relax the conditions of the order in such part or parts of the Division or district as he may consider proper, and for so many of the winter months as he thinks necessary.

Advice.—It is advisable not to dip or spray on cold, wet days, and in the case of working oxen they should not be worked for some few days, as they may show signs of distress, if they do, they should be outspanned and placed in the shade if possible. In addition to dipping or spraying, it is advisable to spray or hand-dress certain parts of the animal (ears, brush of, and underneath tail, etc.), between the dippings or sprayings. Any further advice required may be obtained on application to the Chief Veterinary Surgeon.

Fruit Export.

The following is a copy of a memorandum which has been received by the Acting Under Secretary for Agriculture from the Commercial Agent for Natal in London, on the subject of the export of citrus fruit to England. The memorandum is dated 10th May:—"In view of the lamented death of King Edward, and the period of general mourning that inevitably follows, the London season will practically be a "dead letter" this year, and this will severely react upon the demand for high-class fruit. I yesterday made enquiries at Covent Garden in regard to the prospects before our naartjes, and the general opinion appeared to be that the trade in this particular fruit would be slack, and it would be inadvisable to ship in any large quantity at any rate until the probable weekly consumption could be more closely determined after the first few arrivals. I therefore thought it well to get Reuter's to sound a note of warning in this respect, so that excessive quantities should not be shipped, and advise senders to keep in touch by cable with their agents on this side, in order to regulate the supplies according to the exact demand."

Distance of Planting Cotton.

The following conclusions have been reached, as the result of experiments that have been carried out at the Surat (India) Agricultural

Station with a view to determining the best distance at which to plant cotton in the rows:—(1) The spacing of 18 inches between cotton plants is not sufficient, for the yields of all the plots so spaced have fallen considerably below those obtained from the plots spaced at 24 inches, 30 inches and 32 inches apart, and there is very little to choose between these last three spacings, all giving about the same results in the present season. (2) The best results in the case of thinning have been obtained with a 24-inch interval between consecutive plants. The plots thinned to this distance have yielded at a rate of nearly 40 lb. of seed cotton per acre more than those thinned at 6 inches, 12 inches and 18 inches. This result was obtained on land rather below than above "good condition," having yielded a crop of Guinea corn in 1907-8, at the rate of 1,050 lbs. per acre, while the cotton crop in the present season ran from 300 to 350 lbs. of seed cotton. No manure has been applied to this land, which came into the possession of the farm only two years ago. It will be interesting to see if future years' figures confirm these results. (3) Generally, there seems to be reason for concluding that any arrangement of spacing and thinning which admits of more than 11,000 or 12,000 plants per acre has a prejudicial effect on the yield. The *West Indian Agricultural News*, in commenting upon these conclusions, remarks that the distance of two feet apart in the rows has been found best in similar experiments conducted in St. Kitts.

Protecting Birds.

The following birds have been added to the schedule of protected birds under the Act for the Protection of Insectivorous and Other Wild Birds (Act No. 33, 1896). We give the popular English name and the Zulu name following in brackets:—Barbets, all varieties (isiqopamuti, usibagwebe); bee-eaters, all varieties (izinkota); bitterns, all varieties (utekwana); canaries, all varieties (umzwilili, umzwingili, umbalane); coucals, all varieties (ufukwe); cuckoos, all varieties (inkanku, uhambo, ubantwanyana, pezukwomkono); ducks, all varieties (inada); egrets, all varieties (ukironko, ubone, nozalizingwenya, ilanda, amalandana, anancane); flamingoes; flycatchers, all varieties (isanqawane, uve, intengu, uve lumnyamana); gallinules, all varieties; geese, all varieties (amaransi); hammer head or mud-lark (itegwana); herons, all varieties (ukironko, ubone, nozalizingwenya, ilanda, amalandana, anancane); honeyguides, all varieties (ingede); hoopoes, all varieties (imvundana, unukani); hornbill, ground (insingizi); ibis, sacred (inkondhlo); ibis, hadidah (inkankane); kingfishers, all varieties (isivuba, inhlunu, unongozelo); lapwings, all varieties (tithoya); long-claws, all varieties; nightjars, all varieties (uzavolo); orioles, all varieties (umgoqongo); plovers, all varieties (tithoya); pratincole, collared—small locust bird; pratin-

cole, black-winged—small locust bird; rollers, all varieties (ifemfe); secretary bird (intungunono); shrikes, all varieties except the fiskal jackie hangman (ipeinvu, inqupan, iboboni, uhlazi, umhlopekasi, ugon-goni); shrikes, drongo, all varieties (intengu, intengwana); storks, all varieties (nogolantete, igolantete); sugar-birds, all varieties (umtshivovo); sun-birds, all varieties (umewinewi, incuncu, uncwinewi emnyama); swallows, all varieties (izinkonjane); swifts, all varieties (inkonjane); teals, all varieties (idada); thushes, all varieties (agaga, isihlalematsheni, umutshwi); tits, all varieties; trogon, African or Narina (umndweza); wagtails, all varieties (umvemve); warblers, all varieties (uvuze, ibovi, imbuzana, uboli, ngceta, udogwe); wattled starling; waxbill, all varieties; white-eye (umchlwane); woodpeckers, all varieties (isiqopamuti).

Orange Wine.

Now that we are in the middle of the citrus fruit season, a recipe for making orange wine will doubtless be welcomed by those growers who have more fruit than they know what to do with. The following recipe we take from the *Queensland Agricultural Journal* of recent date:—In a tub or vat of 15 or 20 gallons capacity, carefully cleaned, put 40 lbs. of peeled oranges, rejecting any unsound ones. Then bruise the fruit and pour 4 gallons of water over it. Stir the whole carefully, and work well with the hands until the juice and pulp are separated from the solid matter. Then let the whole rest for ten to twenty-four hours, and strain through a coarse bag, with gentle pressure. A gallon of fresh water is to be added to the mash, to remove any soluble matter remaining, and is strained into the other liquor. From 25 lbs. to 30 lbs. of white sugar are next dissolved in the must or juice thus obtained, and the measure of fluid increased by more water to 10½ gallons.

The must is next put in a tub or vat, over which a blanket is thrown and a board over that; and the whole kept at a temperature between 55 degrees and 60 degrees. Here it must remain for twelve to twenty-four hours, according to the state of the fermentative process. It is then to be drawn off into a cask, until the fluid reaches the bung-hole, so that the scum may overflow and be thrown out. As fermentation goes on, and the bulk of the liquid diminishes in the cask, the superfluous must made for that purpose should be poured in, so as to keep the liquid near the bung-hole. When the fermentation diminishes still more, which may be known by the cessation of the hissing sound, the bung is driven in and a gimlet hole bored on one side. Put a wooden peg in this hole, and remove it from time to time to let the gas escape; when the escape of gas is too feeble to extinguish a lighted match, knock the peg in for good. Then fine the wine with a tablespoonful of isinglass, and in a few weeks it will be fit for bottling.

The "Midget" Motor.

We have to thank a correspondent for drawing our attention to an article in the April issue of *South African Engineering*, describing a new form of farm tractor which has just come on to the market. This particular tractor is the "Midget Universal" motor, the invention of Mr. H. P. Sanderson, the owners of the patent for South Africa being the South African Agricultural and Transport Motors, Ltd., of 62, London Wall, London, E.C. According to the description given by our contemporary, the motor is made for 3 to 50 brake horse-power. The smaller sizes, 3 and 4-h.p., are air cooled, the larger sizes, up to 50-h.p., being water cooled, a tank carrying the cooling water being mounted upon the same carriage as the engine. The carriage for the engine and cooling tank is made of girder iron, mounted on wheels, and can easily be adapted for carrying loads of various kinds, or a belt can be taken from the engine, to drive sawing machines, pulping and grinding machines, pumps, dynamos, and any other apparatus that may be desired. It is arranged in full portable form for carrying loads, and for ploughing, harrowing, and other work.

The engine is made, the smaller forms with single cylinders of 4, 5 and 6-in. diameter, and 5 and 6-in. stroke, the approximate brake-horse-power being 4, 8, and 12½. Two-cylinder engines are made with cylinders of 4, 5, and 6-in. diameter, strokes of 5 and 6 in., the approximate brake-horse-power being 8, 16, and 25. Four-cylinder engines are made with the same diameter of cylinders and strokes as above, the approximate brake-horse-power being 16, 32, and 50.

The engines can be arranged to work with petrol, or with the ordinary kerosine or paraffin oil, that can usually be obtained anywhere, or with alcohol. The speeds of the engines are from 600 to 800 revolutions per minute. The valves are of nickel steel, of comparatively large diameter, the exhaust valve in the water-cooled engines being surrounded by the circulating water. The joints are metal to metal, the exhaust being packed with asbestos. The circulating pumps are of the rotary type. The ignition apparatus usually supplied is electrical, with accumulators and high-tension trembler coils. Magneto ignition can be supplied if required. The lubrication is of the usual splash type, the crankshaft being enclosed in the usual way, the crank-case being divided so that the lower half can easily be removed for examination. The governors of the engine act on the throttle valve, controlling the supply of vapour and air entering the cylinder on the suction stroke. A lever is arranged for advancing and retarding the spark when required, and the same lever controls the throttle. The stationary and portable engines carry tanks form-

ing part of the bed-plates, one tank containing spirit fuel, and the other petroleum, where petroleum is employed. When using petroleum, it is necessary to start on spirit, petrol, the petroleum being substituted as soon as the carburetter becomes warm, which is stated to be in about a minute from starting.

Vanilla Culture.

In an article in the *Queensland Agricultural Journal* for May, Mr. Howard Newport, F.R.H.S., Instructor in Tropical Agriculture, thus summarises the conditions necessary for successful vanilla cultivation:—*Climate*: Tropical humid; rainfall, 60 to 100 inches or more, well distributed, but with a well-defined dry season of two or three months: even temperature about 75 degrees to 80 degrees Fahrenheit. *Soil*: Vegetable mould—i.e., ordinary scrub soil of 6 inches or more in depth, with, by preference, a well-drained subsoil. *Situation*: Gentle slope or flat land, well protected from wind; avoid wet hollows. *Clearing*: Brushed scrub, leaving 250 trees or so per acre, not too dense shade—i.e., that some chequered sunlight is obtained by the vines. *Plants*: cuttings 2 feet to 4 feet long. *Planting*: One on either side of each tree trunk—i.e., about 500 per acre, about December or January. *Cultivation*: Pulling down climbing vines above 6 feet high from trees, and draping over supports, about twice in the season; keeping roots mulched where exposed; pollinating flowers—September to November. *Harvesting*: Gather pods every two days at least—July to September. *Curing*: Dipping, colouring, sweating, drying, and handling; grading and packing for market. *Marketing*: Wholesale confectioners, etc.; prices, 8s. to 16s. per lb. *Returns*: 100 to 120 lbs. per acre of 500 vines. *Cost of Production, etc.*: Estimated cost of opening 5-acre vanillery, £40 per acre, including cost of land and labour, but not living expenses, till bearing: cost of production estimated at not more than 4s. per lb. of marketable vanilla.

Paper from the Bamboo.

According to our West Indian contemporary, *Agricultural News*, the American Consul at Tamsui, Japan, reports that very satisfactory experiments have been conducted recently, near Kobe, by a company which has been formed for the purpose of manufacturing paper from bamboo pulp. An area of 8,000 acres of bamboo forest, in Formosa, has been leased perpetually to this company, and a factory is being erected near Kagi which will be capable of dealing with 300 tons of bamboo pulp a month; the capacity of this factory may be readily enlarged, so as to make it double its output.

The Chinese have made paper from the bamboo for many genera-

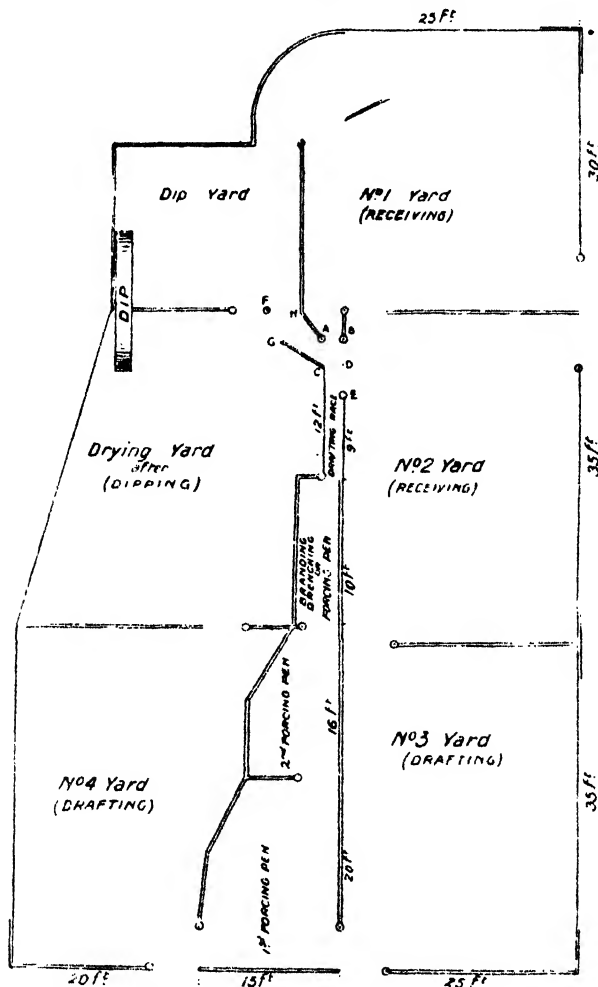
tions, but their primitive methods have only permitted them to employ the shoots for the purpose. The company will, on the other hand, make use of both the young and old parts of the plant. The quick growth of the bamboo will prevent the question of the supply of raw material from ever becoming serious. So far, the paper has been made by mixing wood pulp with that of the bamboo, in varying proportions: the process of preparing the paper from bamboo pulp alone is too expensive at present, compared with making it from wood pulp. The final object is, however, to use a pure bamboo pulp. In its broad outline, the process of manufacture of the pulp is as follows:—The bamboo, chopped into pieces 1 or 2 inches in size, is heated in a digester with calcium sulphite. The resulting product is then washed in water, bleached and washed again. Finally, the wet pulp is pressed, by means of a machine, into the form of web, dried with the aid of steam, and rolled or cut into sheets. This dry pulp will then be manufactured into news and book paper at the mills at Kobe, in Japan.

A Plan of a Sheep Yard.

Mr. Jas. J. McCall, the Government Wool Expert, stationed at Cedara, writes us as follows:—"As I have had several requests from farmers to hand you plan of the sheep-yards which I have erected on this farm, for insertion in the *Journal*, I have now much pleasure in complying with those requests. As the plan is not theoretical, but practical, and may be seen by anyone who may honour the farm with a visit, I have from experience satisfied myself of its utility. All the old-time catching by the legs and throwing of sheep over the fences is unnecessary where such yards are adopted. I have taken about 100 copies of this plan, and shall be pleased to forward one to any farmer requesting same. Should the accompanying explanation not prove lucid enough, I shall only be too happy to explain anything further which may be required." We reproduce Mr. McCall's sketch in the present issue of the *Journal*.

Leg weakness in fowls is often the result of a lack of mineral matter in the food. If you have any birds affected give them ground bone in the mash and notice the improvement.

Commence to feed the pigs as soon as they show a disposition to eat. Commence with a light ration of bran and milk or oatmeal and milk, and then gradually increase as they learn to eat. Give them all they will eat, but no more, as sour food of this kind is injurious.



PLAN OF SHEEP-DIPPING YARD AT CEDARA.

(Scale, 1/20th inch to the foot.)

The above has been drawn from a plan by Mr. J. J. McCall, the Government Wool Expert, who forwards the following explanation:—

Two drafting gates hang on posts A and B and swing between C and D. There is no post at D, but the gate hanging on E meets and overlaps B Gate on the outside. This is to allow of narrowing or blocking the mouth of the race with E Gate and at the same time jamming the two drafting gates. The gate hanging on F swings between G and H and is placed according to the yard into which it is required to draft on that side.

Drafting gate is 3 feet high and made of 1½ inch deal boards.

The double lines show the stakes and rail fences. All interior of yard is stakes and rails. All outside, except corners, is 5 plain wires and wire netting. The small circles show the posts in which the gates are hung.

Cotton Growing on the Swart Folosi.

By ARTHUR DIXON, F.G.S.

I AM at present on a visit to this fertile valley inspecting the various plantations of cotton on the farms Brackfontein, Schoonenzicht, Mongenzon, Bankcroft, Naawport, Vlackfontein, Onricht. In all there are over 10,000 trees of the Caravonica and over 2,000 upland annual plants spread over the above farms as experimental crops.

The climate of this valley is suitable for profitable cotton growing because it has a uniform warmth, being surrounded by high hills which shelter it from cold winds and give the humid air required for cotton, the rainfall being moderated by the attraction of the high lands, and the water shed tapping the carboniferous measures of Northern Natal give in this valley an abundant supply of water for irrigation on a large scale. This rainfall and climate is an ideal one for cotton, and corresponds favourably with many of the cotton fields in other parts of the world, for on the above farms you can pick coffee and tea, arrowroot and chicory, sugar cane and pepper, dates and apples, and other sub-tropical plants.

The soils are largely composed of vegetable humus and the decomposed shales and oxides from the hills above, and are very deep in good loam underlaid by gravel and resting on boulder clay. Thousands of acres of such ground are suitable for growing cotton and are well drained and out of the frost belt of the rivers. By the crops of uplands cotton now in full blow it is evident that they need a heavy loam, and it is well to select the best, friable, well-drained soil of a lighter loam if Sea Island or better kinds of cotton are sown. Thousands of acres here can be placed under irrigation because the lay of the country is such that it is falling southward and the soils which overlap the rock bed are such that they can be well cultivated without being waterlogged. The red loam here above the clay beds if well manured will prove, as is already shown by existing crops, to be good cotton ground, for if the plantations are not shaded from heavy winds and the ground is of too light a nature the heavy top crop loosens the main body of the plant and insures its growth, so lands with heavy subsoil are preferable.

The cotton crop is one that not only requires good tillage but good manuring, and it is advisable to obtain all the surplus vegetable growth and rot it down in holes dug out of the ground and free from water, and layer upon layer cover over with lime and salt to produce nitrate of potash; this rotten compost covered with the liquid urine from the cow sheds and pig styes gives a first-rate manure to the cotton crop. Al-

Sheep and Wool Judging.

By DAN HOCKLEY,
Commando, Adelaide, C.C.

(A Paper read before the Agricultural Judges' Association of the O.R.C.)

WHEN I accepted the invitation in which this Association did me the honour of asking me to take part in the discussion to-day, I did so with a good deal of pleasure, because it has always been a pleasure to me to join in and listen to any discussion where the merino sheep is concerned. At the same time I don't want to sail under false colours. "I don't want any of you to think I am looked upon as an expert in the Cape Colony, as I am only an ordinary sheep farmer, but one who loves the animal and who has always tried to increase his knowledge on the sheep in every way possible. The subject, gentlemen, that I have taken for my paper to-day is "The seeming discrepancy between the judgments of our sheep judges and wool judges at our agricultural shows." This is a matter that has often puzzled visitors to our shows, and, while admitting this seeming discrepancy, I will do my best to throw a little light on the matter, and prove that both sets of judges are quite correct in their judgments. The show committees when selecting judges get their wool judges from the ranks of the wool buyers, and quite right too, because these men, from their training and experience, know more of wool as wool than the man who produces the wool. Now, in handling wool the buyer first of all considers what the yield of wool is going to be, or, in other words, what weight the wool is going to lose in washing. On this he practically bases his calculations. He has to study other points as well, I admit, such as length and strength of staple, the evenness with which these characteristics are spread through the fleece, and also the lustre and quality of the wool. When a wool man, be he judge or buyer has come to the end of his little list of points, he is ready to give his decision.

THE SHEEP JUDGES.

Now, let us come to the sheep judges, and see what they have to do. These men are selected not merely from sheep breeders, but, if possible, from those who have handled stud sheep as well. When judging, these men have to study not only the points considered by the wool judges, but a host of others as well. True, they are not so much concerned about the yield of the wool itself, but have to consider another point of considerable interest to the farmer, and that is the yield of wool per sheep. They

have to see that a sheep is well clad, has his wool well packed on, and carries plenty of it. You must remember it matters little to the wool judge whether the bale of wool he is handling comes off 50 or 150 sheep, while to the breeder it is a point of considerable importance. Sheep judges have to be, if anything, more particular than wool judges about the evenness of distribution, because, in skirted or show wool, all inferior parts such as poor bellies, coarse breeching, etc., are left out. Apart from the wool again a sheep has to be taken and criticised from his teeth to his hoofs. The judge has in his mind's eye to take his wool off him and judge him clean shorn. He must have good teeth meeting the upper pad just at the right place, neither too far forward nor too far back, the nostrils must be broad and open, the head short and broad with jaws set well apart. Now, these points are not mere matters of fancy. They are important. If the teeth are either too far forward (overshot), or too far back (undershot), he can't crop his grass properly, especially when it is a bit short. In fact, such a sheep ought not to be bred from. If the nostrils are pinched, the animal, on a hot day, will stand panting for breath instead of grazing. Between the jaws of a sheep are placed the saliva glands, hence the wider apart the jaws are placed the more fully developed these glands will be; giving more saliva, which is so necessary to a good digestion. The neck should be short and thick, chest roomy and deep, giving plenty of room for the lungs, ribs well sprung and back straight and broad. In general appearance a sire should be big and upstanding, be masculine in appearance. In fact, he should look the sire. A ram undersized and carrying a ewe's fleece would be no good in a stud flock, as his progeny would very likely show want of constitution. I have often seen a ram carrying a fleece commendable to wool judges, quite overlooked at a show for being wanting in the above points. By the foregoing I think, gentlemen, you will see that sheep judges have some points of vital importance to consider besides just the fleece a show animal carries. Besides this there is one point, often overlooked by, probably not known to, the visitors, which will account for the seeming discrepancy in the judgments at our shows. Wool exhibited at shows is taken from the common flock, as the wool is probably more uniform and the farmer has a larger number to select from. Sheep exhibited are selected from the stud flock. Now, what is a stud flock? I take it a stud flock is one possessing in an exaggerated degree all the desirable qualities of the common flock. Wild animals, as we know, are governed by the "survival of the fittest." This preserves their health and constitution. With the domestic animal, on the other hand, man has so completely changed their surroundings that we find a constant tendency to deteriorate, and to become forced to counteract this. Were we to aim at having our stud sheep carrying fleeces as desired by the wool buyers and

judges, our common flock fleeces would gradually get thinner and lighter, and our sheep eventually produce wool more like cobwebs than real wool. Hence the necessity of having our stud flocks perhaps not ideal, but exaggerated. As I may be misunderstood about the term exaggerated, I would like to explain that although a breeder may not admire very yolky or very pleaty sheep, he should tolerate them in his stud flock, as the progeny of these sheep when put to common ewes would be likely to produce stock without their own faults and quite satisfactory to their owner. I do think, however, that in the question of pleats the thing has been unnecessarily over-exaggerated.

The Judging of Shorthorns.

By C. A. POPE,
Molteno, C.C.

(From a Paper Read before the Agricultural Judges' Association of the O.R.C.)

AGRICULTURAL shows can give valuable assistance to our cattle breeders, by directing their efforts into the correct channels, provided always that the officiating judges are conversant with the needs of the country, familiar with the breed they judge, and able to recognise the type of animal that will give the best results. Men will always differ in their opinions, but if these opinions are founded on intrinsic value, rather than minor points or captivating general appearance, we shall be working towards a common centre, viz., the selection of the animals which are going to pay the best. This brings me to the subject in hand, viz. the judging of Shorthorns.

Being essentially a dual purpose breed, every effort should be made to retain this character, by favouring neither the exclusive beef or milking type. The first step in judging a class is to take at once on one side any animal—no matter how taking in shape—which shows any impurity of breeding, or malformation of mouth, or other parts, because we are judging Shorthorns, not cross-breeds; and because purity of blood is indispensable in stud stock. Every pure-bred bears stamped on its countenance the character of its breed; only familiarity with the breed will enable a judge to recognise this point, it cannot be described. Upstanding horns, black noses, not slightly discoloured ones, unless they accompany other suspicious signs. Any colour but red, white, or a mixture of these.

A sleek, hard-looking coat. All these are signs of impurity. There is another on which I place considerable reliance, a decided lightness of the lower thigh, when viewed from the side. Lack of characteristic shape is also a less trustworthy indication. Having now only animals of Short-horn type before us, we look for the points which we associate with conditions. Width between the front legs, large girth, with a good floor to the chest, the underline here should come well below the elbow, well developed, barrel-shaped middle, with long back ribs. These denote large internal organs. A thrifty appearance, and a well balanced form on short, strong, straight legs. Even straight feet. A free, easy walk and evidence of power and energy.

Then we take note of the signs of the natural thicknesses of flesh or muscle. This is easy to see when an animal is in low condition, but at shows high condition will sometimes confuse the senses. Signs are, thickness of thighs when viewed from behind, large forearms, a moderately short neck, thick and fleshy behind the horns, well covered shoulders and full neck vein, a firm touch on the ribs, and other points. If on handling, the flesh is very soft below the skin there is more fat than flesh, and with this a thin hide is generally associated. A moderately fleshed animal, with a full, heavy flank, is as fat as it will get, and consequently will be wanting in natural flesh. Aptitude to fatten in an animal in medium condition is judged of by the kindly contented outlook, the pliable skin and generally lusty, thick-set appearance. In cows we look for signs of milk, but though there are many so called, I have yet to learn that any one, or all combined, are infallible proofs. Still, a nicely shaped udder and teats, large milk veins, and digestive organs, a general refinement of character, with well defined nervous system, are points worthy of note. A pronounced character is of great importance, the bull should also be masculine in appearance, the cow feminine. Shorthorns should be fairly large in size—very large animals are difficult to breed true to shape—but not too unwieldy for getting about on the veld! Weight for age is a most important point, but it must not be forgotten that the thick-set animal on short legs, will often outweigh the tall, apparently larger, animal. The leading societies could with advantage arrange for a suitable weighbridge in their show yards. Loosely made, long backed cattle may give good returns where food is plentiful, but they are unsuited to our present day conditions.

In taking note of the structural points of an animal, we must guard against being misled by high condition. The mouth, teeth and jaw must be fitted to deal easily with coarse food. The head of a Shorthorn should be clearly cut, and intelligent looking—not too fine or delicate. The neck strong, but not too short, and swelling into the shoulders, which should

be laid back—but not too tightly—into the chine. If the shoulder is rightly placed, the blade well covered, and there is thickness through the heart, there will seldom be any deficiency behind the shoulder on top, or at the shoulder point. The ribs should arch, and come well down, giving a flat floor below. The forelock, behind the elbow, should be well filled out. A wide chine—cows should not be too beefy here—level back, thick, wide loin with paralalled edges, well covered hips, not too prominent. Long, wide hindquarters—to length from hip to rump should not be less than two-thirds of a yard, the length from hip to posterior edge of shoulder-blade—well packed with flesh, which should descend squarely to just above the hocks. It is difficult to get the hindquarters equally good above and below; the most valuable portion is the upper, but a flat, square rump running out to a decided rectangle, with deficiency in the thighs, is too often associated with delicacy and want of natural flesh. Still, the top and under lines should be fairly straight in outline, and every part as well filled and covered as possible. Soft, light coloured horns are generally preferred; with age these frequently become darker in hue, but black, or even a dead white are objectionable. The horns should be flat rather than round, not coarse either in bull or cow, and should not rise to any extent above the level of the poll. Eyes bright, and not small or deep-set; very prominent eyes are liable to suffer from the strong light and dust in this country. Nose light in colour. A smooth, even surface of body adds to the appearance, and indicates an even distribution of fat; whereas patchiness or concentration of the fat in lumps is to be avoided. A good carriage of head and neck is very attractive, and a stylish appearance and high breeding generally go together. Quality is judged by the mellow feel of the skin, by the pronounced presence of an under skin or cellular tissue, by the fleshy covering of the brisket, shoulder point, neck vein, and by the soft, silky hair, curly on the forehead of the bull. Length of hair is to a great extent a matter of climate. I have said little about milk indications. There is only one practical way of determining the dairy qualities of a cow, that is testing the quantity and quality of her milk at intervals, and keeping a record of the time she continues in milk before calving.

Exercise is essential to the welfare of both mare and foal. Green pasturage is, of course, the ideal environment for the brood mare, and especially by its cleanliness has a salutary effect in the prevention of ill. The early foal without the advantage of this environment is peculiarly liable to the contraction of disease from germs lurking in the stable.

The Thoroughbred Horse in South Africa.

By CHAS. SOUTHEY, C.M.G.,
Clumstock, C.C.

(A Paper read before the Agricultural Judges' Association of the O.R.C.)

BEFORE entering into a discussion on what is called the thoroughbred, it will be as well to consider the origin of this famous breed of horse, which by its superior excellence, has spread over the civilised world. We know that Great Britain has been the cradle from when this most valuable breed has come to us. The history of the turf tells us that as far back as the 15th Century England possessed a superior breed of horses noted for their speed and endurance, and that the rich barons and ecclesiastics bred and raced them against each other. We have it on record that in those days four-mile heats were run, as often as three times in one day, which is a proof of the enormous power and staying qualities which these horses then possessed. Then we find that during the 16th century large numbers of eastern horses were imported, Arabs, Barbs and Turks, to improve the breed. That the blood of these eastern horses did wonders is well known. One has only to look into the pedigrees of the greatest sires and dams of the stud-book to find that they all trace back to eastern blood. To-day we see in the appearance of many thoroughbreds the resemblance to their eastern forbears, notably Craig Millar and also that greatest of thoroughbred sires Stockwell. In the unbeaten Ormonde, however, there is no trace of eastern blood, but a strong resemblance to the old English racehorse as shown in old prints. I will now turn to the usefulness of the thoroughbred, as there are many people who, either through ignorance or prejudice, prefer to look upon him as valuable only for sport or as a gambling machine, whereas in my opinion he is the most useful horse in the world, namely, for getting remounts for cavalry, or mounted infantry. Those who know what they are about will use no other than the pure thoroughbred sire. All the Continental powers are using him for this purpose, chiefly Austria, as for many years her agents, notably Count Lehendorff, whom since as far back as 1880, have been and still are on the look out to procure the very best of thoroughbred sires for their Government. I have here a book written by the Count, and will quote you what he says on this subject. "What would become of our half-breeds, what of our cavalry, without a continuance of crosses with stallions of pure blood, bred for stoutness and chosen on account of their excellent qualities so as to constantly renew the necessary steel of the



THE EFFECT OF MANURING.

The above illustration, which has been sent to us by one of our readers, shows in a very interesting manner, the effect of manuring upon root crops. Our correspondent's letter describing this picture will be found in our Correspondence Pages in this issue.

breed?" Now, I wish to impress upon you that this same blood is what we require for what is called the "general purpose" horse, as in the future this horse will be our principal arm of defence in South Africa. Not only will we require him here to mount our own South African forces, but to renew the lost trade with India by the exportation of large numbers of remounts for the Indian Army. Now, just one word with regard to the turf. Those good people who disapprove of horse-racing do not understand that the thoroughbred can only fulfil its mission provided that the yearly produce is continually subjected to severe trials on the racecourse, where the inflexible winning-post is the judge as to the merits of the competitors. But for these trials of strength, speed and endurance in the past there would to-day be no thoroughbred, and if the turf ceased to exist so would the horse. We will now turn to the thoroughbred in South Africa. As far back as the time of Sir Charles Somerset, we began the importation of this breed of horses; but previously the Dutch East India Company had been in the habit of getting Arabs down the East Coast, and no doubt the excellence of the old Cape horse which was such a favourite in India sprung from the mingling of the blood of the thoroughbred and Arab as in Britain. Fifty years ago there were many breeders, both in the Eastern and Western Provinces, who bred and raced horses, notably, the van de Byls, Coetzees, van Zyls, Oosthuisens and others, but although these horses were bred from thoroughbred sires, most of them were what to-day we should call half-breds. In '80 I conceived the idea of breeding thoroughbreds, and the first step I took was to go to England and buy not only sires, but also dams, of pure blood, whose ancestors had for centuries been accustomed to compete on the racecourse for victory. I will here hand you a photograph of a filly, bred in the third generation in South Africa, from these imported mares. She is descended on both sides from Stockwell, through Craig Millar and Blair Athol and you will notice the resemblance to her ancestors of the Eastern type. I have long held that given the right blood and treatment this country could produce horses equal to any other country in the world. I might mention Camp Fire as an instance, bred by myself in the third generation from the imported mare, who greatly distinguished himself on the English turf in 1907, and is to-day standing at the stud there. With regard to blood, care must be taken not to in-breed too closely, as it has been ascertained that the best horses in England have been produced in the fourth, fifth and sixth degrees of consanguinity. Horses too closely in-bred nine times out of ten are worthless, and I do not believe in out-crossing. Next to blood comes food and care. The two must go together or the result will be disappointing. At all stages the mares should be kept in good healthy condition. A poor conditioned mare will produce a weakling, resulting in curly

hocks, calf-knees, etc., instead of that robustness and vigour which is absolutely necessary to produce a good racehorse. In conclusion, I wish to impress upon the people of this country not to look upon the thoroughbred simply as a racehorse, for the amusement of the public, but to realise the fact that constant trials of courage, speed and endurance is only the means to an end which in the future is to supply us with an invaluable "general purpose" horse. I now hand you the outlines of a horse with my idea of the points which should be accorded him in the show ring.

Preparing Poultry for Exhibition.

By EXPERIENCE.

IN preparing poultry for exhibition all birds should be in the best of plumage and condition so as to catch the judge's eye. White plumaged birds must be washed, and it would be as well that the exhibitor should be able to wash the fowls. The most essential points to be observed are that three receptacles will be required to properly wash a bird, one for the washing, another for the rinsing, and another in which there is a little bl'w -- No. 1 bath. Place two tablespoonfuls of Lux, then pour some soft boiling water, and let it stand a moment or two and then stir so as to lather well, then pour sufficient water in the bath so as to have it tepid. Then take the bird to be washed and, firmly holding it with both hands, immerse it all except the head, and let it remain under the water till thoroughly soaked to the skin. Next hold the bird by placing thumb and forefinger firmly round the wing joint near the shoulder and with a sponge rub down the bird the same way the feathers grow, commencing with the neck hackle, next wings, then tail, and finally back and under parts. Care must be taken not to damage the sickle feathers of the cockerels, but don't be afraid to put on a little pressure with the sponge. If ordinary care is taken not a feather need be broken; if the shanks are extra dirty use a nail brush freely till all the dirt is removed. Now you can remove the bird to No. 2 bath and immerse it after having rubbed off all the soapy water. This bath must be filled with warm water and bath No. 3 with cold water containing blue. Gently rub down the feathers with a clean sponge, opening the wings under water to remove any soapy substance therefrom so as to enable the feathers to web out properly. Next immerse the bird in bath No. 3. Repeat the process

of rubbing with the sponge, after which remove the bird from bath and holding it firmly by the thigh. Remove all the water possible by means of the sponge, squeezing out the water in the sponge as you proceed.

Next day dry the bird as much as possible with towels, after which place it in a moveable show pen in the warm sunshine; if it is thought the sun is too fierce place a towel on the roof of the pen; some fanciers prefer to wash their fowls in the evening, but from experience I am of opinion that the feathers web out much better with the sun than by placing the pen before a fire to dry the bird, and then there is a risk of placing the pen too close to the fire so as to cause steam to rise from the body, and if placed too far away may cause a chill. A white plumage bird should be washed for the first time about ten days before the show and three days previous to the day of the show.

Birds should be placed each in separate pens three weeks before the show and fed mostly on soft foods, which makes longer feathers. When you first visit the birds after being placed in their respective pens let it be with a few bits of lean meat and approach them gently. After a few days induce the birds to take bits of meat, etc., from the hand, and when they will do this you may safely handle them, but don't thrust your hand into a pen suddenly but move it along the floor gently, then raise it and endeavour to stroke the bird. When you can do this take up the bird with both hands gently but firmly, then set him down again, keeping one hand on its back, and if he rushes about take him up again; the bird will soon get accustomed to this handling. Put him through this performance for a few days, after which you may try to stroke the bird along the back with a cane, so as to enable the bird to get accustomed to the judge's stick or cane, and, when the bird takes to this treatment kindly, get it to stand erect and show itself off to the best advantage and ready for the eventful show day. Many a promising specimen has been ruined through want of a little preliminary training and unaccustomed to handling. It is always advisable when birds are intended for show purposes that they should be frequently handled during their growth. Nothing tames a bird like frequent handling.

I might mention that it is only necessary to wash other than white plumage birds, say, a week before the show. Of course it is absolutely essential that the bird's legs be looked after and in good condition.

The first hen out in the morning and the last one in at night are almost certain to be two of the best ones you have, although the one that gets into the garden every day will give either of them a close chase for first place.

Natal Agricultural Union.

PROCEEDINGS OF THE ANNUAL CONFERENCE.

(Continued from Page 576, Vol. XIV.)

By an error on the part of the printers, the following report of the Government Bacteriologist, laid before the Conference, was omitted from the last issue, where it should have appeared in conjunction with Mr. Fuller's report:—

MR. PITCHFORD'S REPORT.

There is nothing of any great importance to record I think during the last twelve months. Progress in the work of disease investigation is always slow, particularly where such work is undertaken upon a very limited scale—as in Natal, and the past year has been no exception to the rule.

Last year—as you will remember—I was hoping to undertake a series of inoculations in Zululand among the horses of the Zululand Mounted Rifles, in the hope of being able to protect them from the disease horsesickness. The full details of this broader experiment are not yet available, but the results so far—though not so completely successful as I could have wished—are nevertheless quite useful in broadening our experience. Seventy-six horses were inoculated, and of this number—you will see from my report of last November—only thirty-one reacted vigorously, the remainder either failing to react or showing but a slight disturbance of temperature. Of the horses reacting well, only two have succumbed, while of those that failed to react, or reacted feebly, ten or twelve have died. This would seem satisfactory in itself, but a further point has come to light of a less satisfactory nature although it adds to our knowledge concerning this disease.

The deaths occurring among the above non-reacting but inoculated animals are, at the present date of writing, slightly in excess of the deaths occurring amongst the horses left uninoculated. The results of the next two months may disturb this proportion, as evidence is growing that length of time between inoculation and exposure to infection is an important factor, and the Zululand inoculations were not finished till November, or late in the season. I fear, however, we must accept the possibility of the production of an increased susceptibility for a time after inoculation (such as one finds in inoculation of the human being



MAIZE EXPORT AND THE MACHINERY TRADE.

The above illustration gives some idea of the effect which the maize export is having upon the machinery trade. Here we have a view of a single day's consignment of Ruston Proctor Engines and Shellers leaving Messrs. Malcomson & Co.'s Durban Store.

for enteric fever, etc.), and this increase of susceptibility seems to exist to the greatest extent in those cases which have been inoculated with the germs of the disease in the form of a mild vaccine, but have not reacted to the same. This points to the necessity of increasing either the quantity or strength of the vaccine in those cases which are found to resist reaction to the first inoculation, otherwise the condition of susceptibility rather than immunity is for a time increased.

This is quite an unexpected development, and points clearly to the necessity of conducting work of this nature on broad lines instead of the very meagre ones possible to Natal in the past. The general results of the late work in the disease Horsesickness go to show (1) That where horses are inoculated and react to such inoculation, a considerable degree of immunity is produced. (Among thirty-three mules so inoculated, but not exposed to infection in the Tugela Valley until some months after, not a single death has occurred. The majority of these animals have now completed their third sickly season.) (2) That where pronounced reaction does not follow inoculation, such reaction must be forced by repetition of inoculation.

The above is briefly the position at present date with regard to this investigation in Natal, and we may claim that, even if success has not been brilliant, progress has been solid, which, in such a difficult study as the disease Horsesickness, is a matter for satisfaction.

In other directions, also, progress is to be reported. Experiments are now in hand in connection with effect of dipping upon the skin in relation to tick attack, etc.

The measures devised for prevention of the disease amongst calves, known as "Specific Pneumonia," are standing a prolonged test with most encouraging results, this disease being now nearly eradicated for two seasons from the large experimental herd under observation. I hope now to make provision upon an adequate scale for the production of an anti-toxic powder for general issue on farms subject to the ravages of this disease.

Several so-called preventives and cures for East Coast Fever have been looked into and found wanting. At present the remedy of the Oosthuysen Syndicate is receiving attention, but I am not in a position to say anything concerning it until the conclusion of the tests. I hope that none of the ordinary precautions against the disease will be remitted in the slightest until such time as an efficient preventive is secured.

The following is a continuation of the report of the proceedings of the Conference.

RE-STOCKING MAGAZINES.

The delegate of the Krantzkop Farmers' Association moved:—

"That the Government immediately re-stock all the magazines in outlying districts with ammunition as before."

Mr. Sykes seconded.

Mr. Fleming moved as an amendment:—

"That the Government immediately re-stock all the magazines in outlying districts with rifle ammunition for the use of the Reserves and for sale to the public at cost price."

The amendment was carried.

MILITIA ENCAMPMENT AND EAST COAST FEVER.

Mr. Walton moved on behalf of the Donnybrook Farmers' Association:—

"That this Union wishes to pass a vote of censure on the Government for having allowed the Militia Encampment to be held at Taylor's, in the midst of a district grossly infected with East Coast Fever, and with the risk of spreading the disease on the return of the Militia to their homes in other districts."

Mr. Wood thought it was useless crying over spilt milk. It was like flogging a dead horse.

The motion was lost.

EUROPEAN IMMIGRATION.

Mr. Burman moved on behalf of the Durban and Coast Society of Agriculture and Industry:—

"Seeing that the number of the white inhabitants of the Colony is so small, this Union is of opinion that Government should be asked to take into their most earnest consideration the advisability of introducing some scheme for the permanent increase of the European population by the importation of suitable families, to take up and occupy the Government lands of the Colony or lands to be acquired for this purpose."

In moving, Mr. Burman said he understood there were about 4,000 Europeans engaged in agricultural pursuits in Natal; Mr. Moor was credited with stating these figures, but in order to be liberal he would double these figures, making 8,000, and these figures on 36,134 square miles gave one European to every 4½ square miles. Natal had three great sources of wealth—agricultural land, pastoral land, and minerals. They in Natal had passed the sample stage and our crops had become a staple production, though farming, properly understood, was only at the beginning of its career, and it was only by these means that they could get the true prosperity of the Colony. The figures quoted proved conclusively that Natal had room for at least three or four times as many Europeans to occupy the land. This question was brought before the

Union some years ago and was thrown out on the grounds that while the disabilities suffered by the farmers continued, they could not agree to closer settlement. He agreed that disabilities did exist, as they did in every country; there were drawbacks even in the oldest and best regulated countries. Since the resolution was thrown out, they found the settlement of Creighton had sprung into existence, and that at a time when it was fifty miles from the railhead: now it was a thriving settlement, with the railway running through it, and exporting from thirty to forty thousand muids of maize, notwithstanding it was 156 miles from the seaport. Then again since that motion was thrown out, the Government and the shipping companies had introduced a policy by which the farmers could place their maize on the European markets—with what results they all knew. Surely this was sufficient argument; and what could be done at Creighton could be done in other parts of the Colony.

Proceeding, he said he would like to point out that, apart from tick fever, the difficulties engendered by which it was impossible to ignore, there were no disabilities now such as there were two years ago. Grain and produce generally would show a better average return for the last three years than for the previous three years. He pointed out that they had nothing to fear from increased production. The farmers of Natal had done a great deal and suffered much, and he hoped they would not restrict further development by putting a ring fence around what they had done. He hoped that the passing of this motion would lead to every political body taking up this question and to the introduction by the Government of a land policy on such a basis as would attract the best men from Europe to this country.

Mr. Marriott thought absentee landlords should be taxed until they could not exist. (Hear, hear.) This would force the land on to the market. No man should be allowed to own thousands of acres which he was not actually occupying. The opportunity should, further, be given to colonists' sons to acquire the vacant lands of the Colony before such lands were allowed to pass into the hands of oversea immigrants.

Mr. Moon said the Government should first assist the small farmers of the Colony, who were the real producers; and if any money was going to be spent, let charity begin at home.

Mr. Dick said that if this matter was going to be taken up, he hoped the stipulation "suitable families" in the resolution would be acted upon in the proper light.

Mr. B. B. Evans considered that farmers would be well advised to keep their sons on the land instead of, as many were doing at the present time, sending them into the towns. Furthermore, boys on the farm should be taught to fill in their time. It would be far better for them

to be playing cricket or tennis than be lying on their backs reading novels during their spare time.

Mr. Hancock was sure all present would agree with the broad principle of the increasing of the farming population of the Colony, but he did not altogether agree with the resolution as it stood. The question was, what was the most suitable scheme of immigration? With the exception of the Dronk Vlei scheme, all the schemes which the Government had taken up hitherto had proved failures. The scheme suggested in the resolution was fraught with great difficulties, and he would move an amendment urging the Government to continue its efforts in the direction of immigration and land settlement.

This amendment was seconded by Mr. E. J. van Rooyen.

Mr. Wood agreed with the principle of the resolution, but he was not in accord with all the statements made by the mover. For example, 50 per cent. of the available land in the Colony was in the hands of the natives, whilst a considerable percentage of the remainder was not arable, being covered with rocks and stones. Furthermore, Natal could not be compared with Canada and Australia, since in those countries larger yields of crops were obtained. Natal was not a grain-growing country in the sense the mover had suggested. He preferred to let the settlement of the country proceed naturally.

Mr. Smallie said they wanted men with capital—not the class of population that Canada was attracting, which was rather a working population for the towns.

Mr. I. M. van Rooyen said that in his district alone they had lost during the last two years 30 or 40 young men who had not been able to find land locally and had had to go up to the O.R.C. They must look to the rising generation of the Colony for future settlers on the land.

Mr. Blaker said that Mr. Dick had said they wanted “suitable farmers”: even more did they want suitable land to put them on. (Hear, hear.) He considered that they should proceed slowly with the settlement of the land, beginning with their own sons.

Mr. Walton was quite in sympathy with the resolution, but he thought the present was an inopportune time to put the suggestion embodied into effect.

Mr. King said there were only small portions of the Colony which would lend themselves to closer settlement. Closer settlement should be left to be brought about by the young men of the Colony, who should be encouraged to remain on the land.

Mr. Burman withdrew his motion in favour of the amendment, which was then put to the vote and carried.

GATES ON PUBLIC ROADS.

Mr. Mitchell, representing the Lower Umzimkulu Agricultural Association, moved:—

“That this Conference would urge upon the Government the advisability of all gates across the public roads of the Colony being painted white, so as to avoid danger to night traffic.”

This was carried.

P.W.D. CONVENIENCES.

Mr. Cadle moved on behalf of the Weenen Farmers' Association:—

“That, in the opinion of this Union, the time has arrived for the Government to make provision in the way of latrines to be used by the various P.W. Departments wherever camped on the public roads.”

This resolution was carried.

FRANKING CORRESPONDENCE.

Mr. J. M. van Rooyen moved on behalf of the Umvoti Farmers' Association:—

“That this Union is of opinion that Secretaries of Farmers' Associations be authorised to frank all correspondence going through post connected with Association matters.”

The resolution was lost.

ERADICATION OF TOP GRUB.

Mr. Moon moved, in the absence of the delegate of the Umvoti Farmers' Association:—

“That the Union is of opinion that measures should be taken to eradicate the top grub by destroying all old mealie stalks.”

In moving, Mr. Moon referred to the danger which the grub was becoming to the Colony. He advocated burning the mealie stalks as soon as possible, which would help them to a great extent to get rid of the grub. So far as he personally was concerned, for three years in succession he had been careful to break the mealie stalks down with an old railway line, after which he passed a horse rake over, and his mealies had been far better than those of any of his neighbours. He did not say that this was a perfect remedy, but he did think that this would assist them as mealie growers to an enormous extent.

Mr. Rencken asked how they were going to compel the natives to eradicate the grub, and what use it was for the white farmers to do anything if the natives took no action in the matter?

Mr. A. Meyer said his experience was that “vaporite” was the best means of eradicating the grub. It was always effective. Fifty acres could be treated for fifteen shillings, and a boy could cover five acres a day.

Mr. Cadle said that if the measures suggested to be taken to eradi-

cate the grub to be made compulsory by law, then he would oppose the resolution, as he did not see how the grub could be eradicated completely.

Mr. Dick asked if the Government was to be asked to frame some measure for the purpose of dealing with the matter.

Mr. Hancock said he was strongly opposed to this continued interference by the Government with the occupation of the farm. (Hear, hear.) Let them have a little liberty. In what form was the Government to be asked to legislate? And could any measures be devised which would be really effective? (Hear, hear.) He was pleased to add his testimony to the value of "vaporite," which was very effective for the eradication of the grub.

Mr. Oldacre remarked that dust had been found effective for the purpose of smothering the crop: this was, in fact, one of the directions in which Weenen phosphates had been found of value.

Mr. Wood pointed out that, in his district at least, farmers required the stalks for their cattle, and it would be a serious thing if they were compelled to burn the stalks. As regards the natives, he said that in his district they burnt their stalks as fuel.

Mr. Smallie thought the matter was one for individual effort. In his district they would not like to be compelled to destroy their mealie stalks, as it would be a great hardship since they used the stalks as winter feed for their cattle.

Mr. Marwick moved the following amendment:—

"That this Union is of opinion that measures should be taken to induce farmers to eradicate old mealie stalks with a view to eradicating the grub."

At this stage the President pointed out that Mr. Fuller had fully investigated the matter already. The best method, in Mr. Fuller's opinion, of dealing with the pest, was to destroy the mealie stalks during the winter, and perhaps, in the early spring put in trap crops.

Both the original resolution and the amendment were lost.

MAIZE PRODUCTS.

Mr. Wiltshire, representing the Upper Biggarsberg Farmers' Association, moved:—

"Maize being one of the most important products of Natal, this Union is of opinion that, in the interest of the Natal mealie grower, it is the duty of the Government to collect and publish all information procurable—especially from American sources—as to discoveries and experiments, by which the value of the plant may be, and is, enormously increased."

Mr. Wiltshire referred to the results of scientific investigation in

regard to secondary uses for mealies. It had been proved that sugar and alcohol can be obtained from this plant, besides paper.

Mr. Marriott seconded.

Mr. Marwick pointed out that information on all these points had already been published in the *Natal Agricultural Journal*; whereupon Mr. Wiltshire withdrew his resolution.

DOG TAX.

Mr. A. von Levctzow, representing the Vryheid Ward I. Boeren Vereeniging, moved:—

“That this Union earnestly requests the Government to instruct the Police to carry out the provisions of the Dog Tax Act with regard to collars and badges, as the stockowners suffer at present heavy losses, as they are unable to trace the owners of dogs, and cannot claim compensation for destruction of sheep.”

Mr. G. van Rooyen seconded.

Rev. Mr. Scott pointed out that the resolution, if passed and given effect to, would lead to the theft of badges and collars by the natives from the farmers' dogs.

Mr. J. M. van Rooyen moved an amendment advising the Government to restrict the number of dogs by putting an additional tax on all dogs over one.

Mr. Hancock was opposed to any suggestion having for its object the restricting of the number of dogs. Dogs were necessary to keep down vermin, and the more dogs they had the better.

Mr. Moon moved, and it was agreed, that the words “also that farmers be requested to assist the Police by supplying them with the number of dogs on their farms,” be added.

Mr. Van Rooyen withdrew his amendment in favour of the amended resolution.

The resolution, as amended, was carried.

RELATIONS BETWEEN MERCHANT AND FARMER.

Mr. B. B. Evans moved on behalf of the Mid-Illovo Farmers' Club:

“That in the opinion of this Union the existing relations between merchant and farmer are not altogether what they should be in order to develop the best interests of both, and considers it would be advisable for the Union to discuss this matter.”

In moving, he said there was a slight, but unmistakable and growing feeling of distrust on the part of farmers against the merchants.

Mr. Smallie thought this was not a matter which the Union could deal with.

Mr. Burman moved the following amendment:—

“That, in the opinion of this Union, it is necessary that a Govern-

ment weighing bridge be maintained at the Point to weigh any produce that may be required in the interests of buyers, sellers and shippers."

Mr. Evans withdrew his motion in favour of Mr. Burman's amendment, which, on being put to the vote, was carried.

INDUSTRIAL USE OF WATTLE WOOD.

Mr. Bruyn, representing the Noodsberg Road Farmers' Association, moved:—

"That this Union is of opinion that Government should be asked to make experiments with black wattle wood for industrial purposes."

Col. Leuchars, in seconding, said that they had millions of tons of wattle wood which would rot in the field unless some steps were taken to make use of it. He referred to the possibility of using the wood for making acetic acid and paper pulp.

Mr. Newmarch also spoke in favour of experimenting with a view to discovering of what value wattle wood is for paper pulp.

The resolution was carried unanimously.

FAREWELL MESSAGE FROM MR. DEANE.

At this stage the President announced that he had received a letter from the Government to the effect that the Minister of Railways and Harbours (Hon. Col. E. M. Greene) would act as Minister of Agriculture.

He also read the following telegram which had just been received from the Hon. W. A. Deane, who was leaving by the "Bolmoral Castle":—

"Am just leaving Natal and regret my inability to be present with you to-day, but I am with you in spirit, especially in respect of your deliberate decision to uphold the E.C. Regulations for the maintenance of the present restriction of movement of cattle. My parting words to you are that I regret somewhat that the farmers of Natal have not availed themselves as far as they might have done in respect of the facilities offered by Government in regard to loans for the erection of dipping tanks. I am thoroughly convinced that there is nothing to equal dipping. I want to thank those who have so very loyally supported me in my policy, and I feel sure that the excellent fortitude with which so many have borne their losses in E.C. Fever is a sure indication that Natal's stock farmers will still by their courage and perseverance ensure the future welfare and prosperity of our land. Farewell."

It was decided to send the following telegram to Capetown in reply to Mr. Deane's message:—"Conference appreciates and reciprocates your

kind feeling, and wishes you pleasant and profitable journey and safe return."

EAST COAST FEVER—(Continued).

At this stage Col. Greene, the Acting Minister of Agriculture, arrived, and was welcomed by the President. Mr. Evans announced that Col. Greene would like to address the Conference in order to explain the new regulations regarding dipping which the Government had decided to adopt.

Col. Greene, who was received with applause, said that he understood that the report of the Advisory Commission had already been submitted to them. Many of the recommendations in that report commended themselves very strongly indeed to the Ministry, but unfortunately they had not the power under the law to go to the lengths suggested by the Commission. In the first place they had no power to place anyone under licence. The second point was that they should make dipping compulsory throughout the Colony. When the Government had wanted to get the money required for dipping, Parliament would only grant it on the understanding that dipping would not be made compulsory throughout the Colony. As a result dipping was optional. In the event, however, of a district deciding to come under the law dipping could be made compulsory in that district. In reply to a question, Col. Greene said that the law made dipping in such cases compulsory alike for natives and whites. (Applause.)

Col. Greene then proceeded to read a Government notice embodying the new regulations regarding East Coast Fever which had been decided upon. These regulations would come into effect on 15th May; and they were as follows:—

IT IS HEREBY NOTIFIED, for general information, that instructions have been given to all Stock Inspectors and other officers that after the 15th day of May no permits are to be issued for the removal of cattle for any purpose whatever unless in each case the officer is satisfied that the whole herd from which the cattle are to be taken is reasonably free from ticks.

Attention is also drawn to Act No. 20 of 1910, under which meetings may be called in any Magisterial Division or in any districts which may be created within a Division, to consider the question of enforcing the dipping or cleansing of cattle.

Should any Division or District adopt the system of compulsory dipping or cleansing, an order will be issued by the Minister as required by the Act, the terms of which will be to the following effect:—

The maximum time allowed for successive dippings, spraying, or dressing will be ten days;

The cleansing of cattle shall be carried out in one or other of the ways and with the materials stated below;

The order will not be deemed to be carried out unless in every case it is sufficiently thorough to remove all the ticks which may be upon the cattle.

(a) *Dipping*.—Material to be used: "Laboratory" dip or any other preparation approved by the Chief, Veterinary Division. Special Directions: Care should be taken that the ingredients are mixed according to directions. It is advisable not to dip on cold wet days, and in the case of working oxen they should not be worked for some few days, as they may show signs of distress. If they do they should be outspanned and placed in the shade if possible.

- (b) *Spraying—HandDressing.*—Material to be used : (1) Same as for dipping ; (2) Cyllin and oil or grease ; (3) Stockholm tar and oil.

The order will extend to Native Locations lying within any district to which the order may apply.

A reasonable time will be allowed by the order for the erection of dipping tanks in each Division or District.

Inspections will be made of all cattle at least once a month, and cattle owners and any person on whose land cattle may be will be required to give the Inspectors every facility for carrying out their duties.

(References to "Inspectors" include other officers engaged in any similar duties, and when the word "Owner" is used it includes anyone having the charge or control of cattle).

If an Inspector finds any cattle in such a condition as in his opinion shows that the Minister's orders has not been properly carried out he will have the power to require owner to dip, spray or cleanse the cattle to his satisfaction, and in such a way and at such intervals as he may direct, or the Idspector may himself carry out the work and the cost shall be paid by the owner of the cattle. The owner shall give the Inspector every help with labour and otherwise in carrying out the work.

As soon as the cattle throughout any Division or District are, in the opinion of the Chief, Veterinary Division, practically free from ticks, that officer may give instructions to Stock Inspectors allowing the movement of cattle within the Division or District under permits to be granted on suitable conditions.

Such an instruction may be recalled by the Chief, Veterinary Division, if at any time he finds that the cleansing of cattle has not been properly carried out throughout the Division or District.

(The expression Chief, Veterinary Division, will include the Principal Veterinary Officer in Natal, by whatever title his office may be known).

The Chief, Veterinary Division, shall have power, upon receiving a representation from not less than twelve cattle owners in any Division or in any District in the Division, that, owing to the severity of the winter, dipping cannot safely be carried out as required by the Minister's order, and after satisfying himself that such is the case, to relax the conditions of the order in such part or parts of the Division or District as he may consider proper, and for so many of the winter months as he thinks necessary.

In reply to a question, Col. Greene said that, under the regulations governing the advances to farmers for the construction of dipping tanks, applicants had 15 years in which to pay, and no instalment was due for the first two years.*

A number of questions were put to the Acting Minister of Agriculture; and after a hearty vote of thanks had been passed to him for his presene and for his explanation of the new regulations Col. Greene left the meeting.

ORGANISATION OF THE UNION.

Mr. Hosking moved on behalf of the Royal Agricultural Society:—

"As, under present conditions, all the members of the Agricultural Union are delegates from the various Agricultural Societies or Farmers' Associations, in order to encourage a greater interest to be taken in the agricultural matters of the Colony, this Union is of opinion that some scheme should be formulated, providing that anyone can become a member of this Union, with all privileges and rights to vote, by payment of an annual subscription of £3 3s., without representing any special Agricultural Society, but any candidate for such membership to be nominated

*We published in our last issue full particulars of the terms upon which Plans can be obtained from Government by farmers for the purpose of constructing dipping tanks.—Ed.

and voted for by the members of the Agricultural Union, on conditions to be agreed upon hereafter, past delegates only eligible."

Mr. Moon seconded.

Mr. Hyslop pointed out that if this motion were passed they would change the character of the Union. They were a Union not of private individuals but of bodies of farmers.

Mr. Mitchell said he considered they were quite out of order in considering such a resolution as this without the usual 60 days' notice being given.

The President ruled accordingly.

FINANCES OF THE UNION.

The adjourned debate was continued on the resolution moved previously by the Royal Agricultural Society's delegates to the effect that the time had arrived when Government should be approached for an annual grant of £1,000 to the Natal Agricultural Union. After some discussion the resolution was put to the meeting and lost.

In view of the condition of the finances of the Union Mr. Mitchell moved that the various affiliated associations be asked to assist by increasing their subscriptions to the extent of 50 per cent.

After some discussion, it was decided to levy 50 per cent. on the amount of last year's subscriptions.

E.C.F. ADVISORY COMMISSION'S REPORT.

Mr. Mitchell moved the consideration of the E.C.F. Advisory Commission's report. He proposed a hearty vote of support in respect of the report.

The President said that this was the last chance they would have to fight East Coast Fever. The suggestions embodied in the Commission's report constituted the only way there was left to them to deal with the disease. He appealed to them to pass the report loyally and with one vote.

Mr. Hyslop said there was one recommendation in the report which he would like discussed before the report was passed. This was the suggestion of the fencing in of infected areas for the mere purpose of stamping out the disease.

Col. Leuchars said that the vote of the previous day against Mr. Scott's motion confirmed the report. He could hardly vote for the report after voting for Mr. Scott's motion.

The President did not understand this attitude at all. He did not see any connection between the rejected resolution and the report. Regarding Mr. Hyslop's remarks, he did not think there was any chance of a Union Government stepping in and stamping out herds of cattle. For himself he was quite prepared to take the risk.

Mr. King took the same view of the matter as Mr. Hyslop. If they passed that portion of the Commission's report it would give the Union Government an excuse to adopt stamping out, which they would be ready to take advantage of.

Mr. Power said he did not think that stamping out should be done everywhere indiscriminately to the west of the line—only in isolated cases where considered advisable.

Mr. Mitchell drew attention to the next paragraph of the report which stated that stamping out would not be confined to the west of the main line, and that only where necessary would stamping out be adopted.

In reply to a question, Mr. Power said he was not in favour of any general stamping out, either to the east or to the west of the line. Proceeding, he considered that the words "where considered advisable" should have been added to the clause of the report in question.

Mr. Newmarch considered that they should not vote on the report at all.

Mr. Wiltshire said the question was, how would those who had to administer the law giving effect to the recommendations of the Commission interpret this portion of the report? He considered it was a most serious question.

Mr. Mitchell asked leave to withdraw his motion.

This was agreed to.

EAST COAST FEVER INVESTIGATION.

Mr. Landsberg moved on behalf of the Krantzkop Farmers' Association:—

"That this Union is of opinion that the Government set aside a sufficient sum in order to investigate the more prominent alleged cures for East Coast Fever."

Mr. Blaker asked Mr. Power what steps the Government was taking in this direction.

Mr. Power replied that the Government Bacteriologist was carrying out investigational work in connection with East Coast Fever. The Government was always willing to test alleged cures, provided that the owners of the "cures" were prepared to meet all expenses.

The resolution was carried.

TRAFFIC OF NATIVES.

Mr. Smallie moved on behalf of the Hatting Spruit Farmers' Association:—

"That Government be requested, per means of Magistrates and native chiefs, to endeavour to stop the constant traffic of natives through fences otherwise than by gates and roads."

Mr. Oldacre seconded.

Mr. Landsberg pointed out that there was already a law on the subject.

Mr. Newmarch referred to a case in Greytown recently where a native was prosecuted for entering a farm through a fence, but the Magistrate had discharged the native.

The resolution was carried unanimously.

IMPORTATION OF MULES.

Mr. Van Rooyen moved on behalf of the Weenen Farmers' Association:—

"That this Union recommends the Agricultural Associations to take steps to import mules for their members."

Mr. I. M. van Rooyen seconded.

The resolution was carried unanimously.

SHIPPING REBATES.

Mr. Mitchell moved:—

"That, in the opinion of this Union, the time has arrived to ask when shipping rebates should be made illegal."

The resolution was passed.

DELEGATES TO HET KONGRES.

Messrs. Von Levetzow, I. M. van Rooyen and Wiltshire were appointed to represent the Union at the Conference of Het Kongres to be held at Vryheid in May.

A vote of thanks to the President and Executive for their labours during the past year brought the proceedings to a close.

EAST COAST FEVER.

In the course of the Executive Committee's report, the following report on proceedings in connection with East Coast Fever resolutions was read:—

The resolutions carried at last conference were forwarded to Government immediately after the Conference, and replies were received on 28th May, 1909. A meeting of the Executive was held on the evening of 17th June to discuss these replies, and at that meeting it was decided to arrange a meeting with the Minister of Agriculture and Prime Minister. This meeting took place on the 18th, when the Minister of Agriculture and the committee went fully into the whole question. The Prime Minister and Treasurer were also seen at different periods of the interview. The whole position was fully discussed, and, as a result, the Executive afterwards communicated with the Minister of Agriculture thanking him, the Prime Minister and the Treasurer for the cordial reception accorded to the committee, and noting the following points gained through the interview:—

- (1) A sum of £30,000 to be immediately available for the purpose of fencing throughout the Colony.
- (2) The fencing to be commenced without delay and actively carried out.

In the letter to the Government confirming these views the President drew attention to the increasing feeling among farmers that the restrictions then in force were unduly hampering their operations, and that unless movement of cattle were entirely stopped farmers would rather see all restrictions removed. It was again urged that assistance should be claimed from the other Governments of South Africa, either by loan or grant to enable Natal to obtain complete control of East Coast Fever.

From this date till September, when the meeting of the Inter-Colonial Union was held, the matter was left in the hands of the Government. It was felt that a fencing scheme must in any case precede the larger programme for dealing with East Coast Fever set forth by the Conference. It became evident, however, during this period that the Inter-Colonial action urged by the Conference was not taking place and did not appear to be seriously urged by the Natal Government. The subject was, therefore, brought before the Inter-Colonial Union on 5th September, when the following resolutions were passed:—

- (1) That this Union is of opinion that the various Governments of South Africa should be approached with a view to securing united action for the eradication of East Coast Fever.
- (2) That each Government be requested to take immediate action to give effect to this resolution, and that a representative of each Colony and State be appointed to form a permanent committee, and to approach the various Governments to urge the carrying out of the resolution. Each Colony to appoint its representative.

In conformity with these resolutions a committee was elected as follows:—Messrs. G. C. Lee (Cape Colony), E. W. Evans (Natal), E. A. Hull (Rhodesia), J. Connacher (Mozambique), A. Robertson (Transvaal), and J. C. Kolbe (O.R.C.). This committee immediately took action by telegraphing to each Government as follows:—"This Union views with alarm outbreaks of East Coast Fever near Cape Border which seriously threaten that Colony. Union is of opinion that united action should be taken immediately to stamp out disease in this area and establish a clean zone between Natal and Cape, and that carrying out this scheme should be placed in hands of Veterinary Departments of States concerned."

Telegraphic replies were asked, and on the 11th September the committee had a meeting to discuss a wire from the Cape Minister of Agri-

culture notifying that he was arranging a Conference of Ministers of the various Colonies to sit at Capetown of Tuesday, 14th September, to discuss the question of united action. The committee wired to Mr. Malan that it was deeply anxious to see steps taken to safeguard clean areas from threatening danger, and was gratified to hear of the projected Conference of Ministers, and expressed the sincere hope that the steps urged in a previous telegram would be decided on immediately, seeing that to all intents and purposes South Africa was already unified, and one Colony's interests were the interests of the whole Union. In sending a copy of the telegram to Mr. Deane, the hope was expressed that a representative from Natal was being sent, or failing that, that there would be given full information which would help to bring the Conference to a conclusion on the lines suggested by the Union.

The Conference referred to above took place, and was attended by Mr. Moor, Premier of Natal, who was on his return journey from England. It was afterwards reported that the Conference had been abortive. Following upon this report the action proposed to be taken will be gathered from the following letter sent to the members of the Permanent East Coast Fever Committee—

INTER-COLONIAL AGRICULTURAL UNION OF SOUTH AFRICA.

Durban, 18th September, 1910.

Dear Sir,—In view of the reported failure of the Conference on East Coast Fever at Capetown from which the special East Coast Fever Committee of the Inter-Colonial Union expected united and definite action, the President recommends that the following steps be taken to ensure the carrying out of the wishes of the Inter-Colonial Union. The President, while acting in his capacity of President of the Inter-Colonial Union, also acts as President of the Natal Agricultural Union, and in order that all concerned may understand what is being done, it is desirable to treat the subject from the Natal point of view and then from the South African point of view as initiated by the Inter-Colonial Union. The Natal point of view is essentially the same as that adopted by the Inter-Colonial Union, although the details are more elaborate in the case of Natal.

1. The Natal point of view and action to be taken. At the last Conference of the Natal Agricultural Union the following resolution was passed:—

- (a) There shall be uniform laws for the repression of this disease for Europeans and Natives alike.
- (b) No movement of any cattle for any purpose whatsoever should be made from the infected herds or areas.
- (c) All infected cattle and any cattle which have been in con-

tact with such cattle should be destroyed, and adequate compensation paid therefor.

- (d) There should be compulsory dipping or spraying to ensure the cleansing of all stock liable to be tick infested, at such times and intervals as may be necessary.
- (e) Negotiations should be opened with the adjoining States for the purpose of obtaining joint action at joint expense in carrying out the means to be employed for the eradication of Tick Fever.
- (f) The Government should put into operation the present Fencing Act (No. 6, 1907), and that all infected areas should be fenced immediately.
- (g) Compulsory branding of all cattle should be enforced.
- (h) In the event of the Government having no satisfactory announcement by 31st May next, to the effect that the other Colonies have agreed to stamp out infected and in-contact cattle jointly with this Colony on a satisfactory basis, the President shall be requested to call his Executive together to confer with the Government regarding their future plans, and, if it thinks necessary, he may call a meeting of the Union.

In an interview with the Minister of Agriculture after the Natal Conference promises were made to carry out a fencing policy, and this was regarded as a necessary step towards stamping out. The cost of stamping out was quoted as a complete bar to that method of dealing with the disease, but the Natal Executive hoped to gain further recognition of their aims once fencing was well on the way. With reference to assistance from other Colonies, the Minister led the Committee to believe that this had been refused. Since then there has been no progress in means for dealing with the disease except that a regulation has been made to prevent the passage over clean veld of cattle taken from infected veld to railway for slaughter. This is a questionable concession, and does not meet the demands of the resolution.

Therefore, taking in detail the heads of the resolution the position is:—

- (a) The Government deny that there is any differentiation, but the fact that the Government, as the Native Trust, has refused to fence location lands, while they require Europeans to fence under certain conditions is a very important differentiation.
- (b) Cattle are still freely moved from infected areas to rail, although not supposed to be moved over clean veld.
- (c) Nothing has been done to carry out this.

(d) Nothing done.

(e) Government state that other Colonies refuse to do anything.

(f) Nothing done, although promise has been made to fence.

(g) Government refuse to brand on account of fear of natives. They will not even allow native cattle to be counted.

(h) In view of the failure of Government to do anything this proposal will be carried out subject to arrangements made hereafter.

2. The motion carried at the Inter-Colonial Union was as follows:—

That this Union is of opinion that the various Governments of South Africa should be approached with a view to securing united action for the eradication of East Coast Fever

The President believes that a course of action founded on the Natal resolution, modified to suit the needs of the different Colonies, would meet the requirements of the above resolution

The President, therefore, is arranging for a meeting with the Minister of Agriculture and other members of the Ministry at an early date, and he is going to put before them the demands of the Natal Union, backing them up with the Inter-Colonial Union. He is going to ask for:—The adoption of the policy outlined in the permanent Committee's telegrams to the Minister of Agriculture of the Cape Colony, and also to the Minister of Agriculture of Natal (with reference to the Alfred County outbreak), which is a stamping out and fencing policy, with the aid of the Cape Colony added, and the administration left in the hands of the Veterinary Departments concerned.

Should this not be granted then the course of action will be:—

1. To call a meeting of the Natal Union to re-affirm the April resolution and arrange for a parliamentary campaign to attain the ends desired by the Union;

2. To get the assistance of the neighbouring Governments through the members of the Permanent Committee;

3. To, as a last resort, lay the matter before the High Commissioner and invoke his aid.

In anticipation of this work Mr. E. W. Evans will be glad if you will lay the Natal April resolution before your Government and find out how far they are prepared to support it: but especially to find out what assistance had been offered to Natal, and how this has been treated.

I am sending for your information copies of the proceedings of the Permanent Committee, together with correspondence and replies to date.

I will be glad if you will take this matter up strenuously, as only

by so doing is there any hope of this terrible disease being ended.—I am, yours faithfully,

DUNCAN M. EADIE,

Secretary, Inter-Colonial Agricultural Union.

The next step was to interview the Natal Government, and this was arranged for 28th September, the President assuming the duty of finding out the views of Ministers before deciding to call the Executive of Conference together. What happened at this interview is summarised in the following *precis*, which was afterwards circulated among members of Committee:—

Notes of Interview between the Prime Minister (Mr. Moor) and the Minister of Agriculture (Mr. Deane) and the President of the Inter-Colonial Agricultural Union and Natal Agricultural Union (Mr. E. W. Evans), who was accompanied by the Secretary of these Unions (Mr. Eadie), on Tuesday, 28th September, 1909, at the Colonial Office, Maritzburg.

The interview lasted about three hours, the central feature of the discussion being:—

1. The efforts made by the Natal Government to combat the disease.
2. The proposals of the Natal Agricultural Union to deal with the disease.
3. The Inter-Colonial Union's proposals for united action.
4. The action which has been taken in view of (a) the Natal Union's proposals, and (b) the Inter-Colonial Union's proposals.
5. The policy of the future.

The discussion of these points was not consecutive, but the expressions of views upon them are summarised in the above order for the purpose of obtaining clearness.

As to 1: The Minister of Agriculture, on the question being put to him, after long discussion, admitted in unqualified terms that the efforts of the Government to deal with the disease had ended in failure, and, from the farmer's side, the President of the Union admitted that the efforts of the farmers (the scheme of Advisory Boards being in particular view) had also failed.

As to 2: The resolutions of the April (1909) Conference with their related replies were read. While the Ministers appeared to have the opinion that these replies were of a satisfactory nature, the President held strongly that they did not meet the case in any detail, and these resolutions finally remained the basis of the demands made by the President on behalf of the Union.

As to 3: The Inter-Colonial Union action had had two main points,

first, the Union's resolution urging unified action, and second, action taken by East Coast Fever Committee urging stamping out, with the assistance of the Cape Government, in Alfred County. On these two points the chief discussion took place, and during the conversation the Prime Minister was understood to admit that dipping had failed to stop the disease, and the Minister of Agriculture gave assent to that admission. Other points arising under this head are dealt with below.

As to 4 (a): It was explained by the President that when the Natal Union Executive met the Ministers in June they had been told that a policy of fencing would be initiated and the Treasurer had agreed to place \$30,000 at the Minister of Agriculture's disposal for the purpose. The Minister of Agriculture now stated that the fencing was being carried out, and when asked whether fencing was being carried out on a comprehensive scheme to include the whole Colony, said it was impossible to do more than was being done at present. The other main points of the Union programme, *viz.*, Compulsory dipping, branding and stamping out, became merged in the general question of action by all the Colonies, the Minister stating that the necessary funds for the carrying out of this comprehensive scheme could not be raised by Natal without the sanction of the other Colonies, and an agreed arrangement that the expenditure should become a charge on the Union Funds.

As to 4 (b): A long discussion took place on the action which followed the resolution of an Inter-Colonial Union and the further work done by the East Coast Fever Committee of that Union. It was gathered that the Conference held at Capetown as a result of these resolutions had been abortive, but after pressing for the necessity of a definite statement on the general question of the resulting position, the Prime Minister said: "Harding is being fenced with the greatest expedition possible, and, if it is necessary, I personally believe the Cape Government will take a share in stamping out in the infected area in Harding; but I positively decline to believe that the Cape Government will help us with regard to the rest of the Colony; while the Transvaal has emphatically refused to take up a general policy before Union." The President insisted that the Government officials at the Inter-Colonial Union meeting had unanimously agreed as to the serious situation which had arisen in South Africa through the spread of East Coast Fever in Natal, and had urged united action, and he further expressed the opinion that the Capetown Conference, composed of men who were unacquainted with the situation, was mostly valueless, and foredoomed to failure. As a consequence, he urged continued endeavour to bring about an understanding.

As to 5, finally: The Prime Minister undertook to get into communication with Mr. Botha as soon as he arrives in South Africa, with a view to the carrying out of the policy urged by the Unions.

In conclusion, the President desires to say that action has been taken

since the interview towards bringing about a conference between the Ministers of Agriculture of the various Colonies and their advisers. This cannot be held with any hope of success until Mr. Botha's arrival in Pretoria in about a fortnight's time but every effort is being made to bring this about.

You will be duly advised of the progress of events, and meanwhile no time is being lost.

NOTE.—Since the above was typed, it has been reported that a Conference has been arranged for Bloemfontein on the 29th inst. It is hoped the Presidents of the Unions will be asked to attend, and steps to have them invited have been taken.

As a result of the interview, and by the aid of the Colonial Presidents, a fresh Conference of Ministers was arranged for 29th September. At this Conference none of the Unions were represented. The result of that Conference is believed to have been entirely favourable to the views of the Union, as arrangements were made, it is understood, for financing a combined attack on East Coast Fever on the lines laid down by the Unions, thus removing the chief objection of the Natal Government to effective treatment of the disease. But for some reason, which can only be conjectured, the results of the Conference were not confirmed by the Governments concerned, and the position towards the end of last year was, in the opinion of your Executive, as bad as could be. However, steps had been taken to approach Parliament directly in order to have the demand of the Union acceded to, and Associations co-operated heartily with the Executive in obtaining information about the manner in which the existing East Coast Fever regulations were working. Your President was constantly in touch with the Government on the subject, and, in view of promises made and the expressions of members of Executive on the subject, it was decided to postpone calling the Conference together.

In Parliament the subject of East Coast Fever was keenly debated, and at the end a large sum was voted for fencing, dipping and preventive measures. In addition, provision was made for an Advisory Board, which was only recently appointed. It consists of the following gentlemen:—

A. H. Walker, M.L.A., E. W. Evans, G. Langley, J. Henwood, and Thos. Fleming. This Advisory Committee is appointed under Act 20, 1910, which provides for loans for dipping and fencing.

The President, who is Chairman of the Advisory Committee, has reported to the Executive that the Committee had made recommendations to the Government on the lines of the Conference resolutions. At the time of writing this report no information had been received about the answer of the Government to the Committee's recommendations.

DUNCAN M. EADIE, *Secretary.*

Royal Agricultural Show.

ANNUAL EXHIBITION.

ON Thursday, Friday, and Saturday, the 16th, 17th, and 18th June, the Royal Agricultural Society of Natal held their annual show in the Society's grounds in Maritzburg, amid perfect weather. The Show was opened by His Honour the Administrator, Mr. C. J. Smythe, and there were a fair number of people present at the opening ceremony. Judging began at 10 a.m. on the first day, and continued during the whole morning, the judges in some of the sections having a very difficult task owing to the keenness of the competition.

At 12 o'clock the opening ceremony took place. The President of the Society, Mr. Jas. King,* in calling upon the Administrator to open the Show, said that he was happy to be able to state that the Show opened under auspicious circumstances, though there was an absence of cattle sections. It seemed to him that the prospects of soon getting the cattle back to the Show were remote. Of course, the absence of cattle was a reflex on other exhibits. He remarked upon the feature of the Show as seen in the poultry section. Poultry was a most important feature of the Agricultural Show. He was happy to say that the poultry club was still with them, and working in conjunction with the Agricultural Society. He had to thank the Corporation of Maritzburg for the liberal support which that body had always given to the Show. And through the Mayor he had to thank the burgesses of the City for the way in which they helped the prize list. A new departure was the appointment of a ladies' committee of the Society, and he desired to express the gratitude of the Society to the ladies' committee for what they had done this year. (Hear, hear.) He mentioned that the entries totalled 2,454, an increase of 150 on the previous record in 1905. In that year the entries included some 400 cattle. Why certain firms did not show in the machinery yard this year he did not know. On behalf of the Society, he congratulated Mr. Smythe on his appointment to office of Administrator, and, while the general interests of South Africa would claim attention, he was quite sure that the interests of Natal would be near his heart because he was one of them. (Applause.)

THE ADMINISTRATOR'S SPEECH.

The Administrator, in replying, said that it was pleasant indeed to be able to congratulate them upon an undertaking which was a success,

*We are indebted to the *Natal Witness* for notes of Mr. King's and the Administrator's speech.—Ed.

and he thought he could safely say that the present Show of the Royal Agricultural Society of Natal was a thorough success. Success could only be brought about by the executive and secretaries, and there was no doubt that a great deal of hard work had been entailed on these gentlemen in connection with the Show.

There was one point on which the Society was to be congratulated, and that was that owing to improvement in the finances of the Colony the Government were able before going out of office to relieve the Society of the debt, which in the past had been a heavy burden upon them. (Hear, hear.) He understood that the Government had relieved them almost to the extent of the whole of their debt, and he hoped that the remainder of the debt would soon be paid off, so that the Society would continue to carry out the work it had undertaken. It was good that the ladies should take a special part in connection with their Shows. He understood that the Society was indebted to the wives of the burgesses of Maritzburg. The burgesses had an interest in these Shows. He regretted that the exhibits in the machinery classes were not so good as in the past owing to the reluctance of certain firms to show. He thought that it was a great mistake on their part. One of the most interesting features of the Show was the exhibition of machinery. He regretted extremely that those firms had thought fit not to show. The Society was to be congratulated on the large number of entries. He regretted that he saw no success in dealing with East Coast Fever, except by obstinate and thorough cleansing of cattle in the dips. (Applause.)

The Administrator concluded by formally declaring the Show open.

Cheers were given for the Administrator, the late Government, the Mayor, and the President of the Society.

The absence of cattle, of course, detracted somewhat from the value of the Show, as it has done in previous years, but, leaving out this section, the Show may be described as a success. So far as entries were concerned the Show was certainly in advance of last year's, the number of entries this year being 2,454, as compared with 2,184 last year. At the same time, however, we do not think that the Show, taking it as a whole, was quite up to the mark of last year's. Except in the kennel section, the standard of quality of exhibits set by last year's Show was fairly well maintained this year, but there was perhaps less variety, regarding the Show as a whole. In some sections the competition was very good indeed—a feature which always speaks well for a show.

The machinery section is generally one of the great features of an agricultural show, especially of shows of the size and importance of the "Royal." This year for some reason or other several leading firms stood out, and the consequence was that the machinery section, although it was up to the standard of previous years as regards quality, was never-

theless less in respect to the number of entries. A great deal of attention was paid to this sections by visitors, and a large number of useful and up to date implements and machinery were to be seen. The industrial exhibition attracted as usual large crowds of people, the hall being thronged during the whole term of the Show after the official opening. There was a particularly good show of fruit in the Industrial Hall, variety being almost as noticeable a feature as excellence. The ham and bacon products also calls for special mention, being of exceptional excellence and variety. The Natal Mill and Elevator Company had a good show of their cereal products; and the various foods such as brawn, bread, cakes and confectionery generally, aerated waters, wine, vinegar, etc., were well displayed and generally of high quality. The Natal Bee-Keepers' Association occupied with their exhibits a corner of the hall, and a high standard of excellence of the products of the number of entries of this section afforded striking testimony to the progress which bee-keeping is making in Natal. Perhaps the best section of the whole Show was the poultry section. We do not remember to have seen at the "Royal" Society's Show such an exhibition of poultry of such all round excellence. The competition in this section was very keen indeed, and the judges had a difficult time making their decisions. In the horse section most of the classes were fairly represented, and, as usual, some good animals were shown. The sheep section was in our opinion an improvement on last year's, and the number of exhibits were large. Goats also were an improvement. Pigs compared favourably with last year's, but we should like to see more attention paid to this section. The kennel section, as we have stated, was not as good as in previous years, but this was due to the fact that the Kennel Club was holding its show at the same time elsewhere in the town. The farm products section was well patronised as usual; and the exhibits in this section had this year every opportunity for a thorough display on account of the change which the Society has been well advised to make in regard to the housing of the exhibits. The outside stalls did not appear to be as large in number as they have been in previous years.

JUDGES AND STEWARDS.

The following were the judges and stewards:—

Thoroughbred Horses.—Judge, T. T. Murray; stewards, J. Blackburn and B. Baikie.

Cart Horses.—Judge, D. C. Dick; steward, W. L. Stead.

Thoroughbred Horses.—Judge, E. T. Murray; stewards, J. Blackburn and A. C. Sedgwick.

Saddle Horses.—Judge, S. T. Amos; stewards, C. M. Scott and G. F. Sedgwick.

Mules and Donkeys.—Judge, J. F. Palframan; steward, W. Westwood.

Merino Sheep.—Judge, C. J. King; steward, A. Dickens.

Shropshire Sheep.—Judge, H. Stedman; steward, J. C. Walker.

Longwool, Persian, and Cross-bred Sheep.—Judge, H. Stedman; steward, H. C. Edmonds.

Fat Sheep.—Judge, F. Knapp; stewards, W. Lang and W. F. Knapp.

Goats.—Judge, H. D. Witner; steward, Reg. Campbell.

Pigs.—Judge, J. Marwick; steward, F. Ellenor.

Produce, Kafir Corn, Wheat and Mealies.—Judge, C. E. Thrash; stewards, P. A. Robinson and J. Baker.

Grains, other than above, also Fodder, Ensilage, and Winter Food.—Judge, T. M. Mackenzie; steward, C. J. Arnold.

Wattle Bark.—Judge, Rev. Jas. Scott.

Roots and Vegetables.—Judge, H. Baker; stewards, S. Moon and F. Robinson.

Fruits.—Judge, T. R. Sim; steward, P. Merrick.

Butter.—Judge, E. E. Holman; steward, Collin Campbell.

Cheese, Bacon, Oil Cake, Soap, and Candles.—Judge, W. Merrick; steward, N. Y. Griffin.

Bread.—Judge, Mrs. Theo. Woods; steward, A. Herbert.

Cakes and Pastry.—Judge, Mrs. P. Davis; steward, C. W. Holdgate.

Children's Corner.—Judge, Mrs. Jno. Baynes; steward, Bert Herbert.

Preserves and Aerated Waters.—Judge, F. Reed; steward, H. W. Griffin.

Coffee, Tea, Sugar, Tradesmen's Stalls.—Judge, W. H. Griffin; steward, J. Reid, jun.

Engines, Wind Mills.—Judge, Arthur Wood; steward, A. McDonald.

Millers' Manufactures.—Judges, Thos. Hyslop, Rev. Jas. Scott, E. W. Evans.

Axe Handles, Fretwork, Wood Carving.—Judge, D. Bailie; steward, J. Reid, jun.

Furniture, Tins, Boxes, Gates.—Judge, J. Hardy; steward, R. H. Pepworth.

Handcarts, Wagons, and Trolleys.—Judge, D. C. Dick; steward, A. C. Bell.

Carriages.—Judge, E. Tooth; steward, F. Collier.

Bees.—Miss A. E. Pullinger and Mr. R. H. Pepworth; steward, H. G. Whelan.

Dogs.—Judge, H. H. J. Iken; stewards, A. van Aardt and W. G. Stacey.

Sports, Jumping, Riding, Trotting, and Driving.—Judge, S. T. Amos.

Musical Stalls, Polo Ball Race, Donkey Polo Match in Costume, Ribbon Race, Tent Pegging, Happy Husbands' Race, Wrestling on Horseback, Costume Race.—Judge, Col. Sir D. McKenzie; steward, Capt. Clerk.

Sports Stewards.—D. C. Dick, H. Solomon, and R. F. Smithers.

Crochet Competition.—Judges, Lady Murray and Mrs. Hosking; steward, Miss May Campbell.

Industries.—Judges, Rev. Jas. Scott, E. W. Evans, Thos. Hyslop.

Chief Stewards.—Horses, A. E. Todd; produce, P. H. Campbell; hall, A. Robinson.

Sports Committee.—D. C. Dick, H. Solomon, Commissioner Clark, Capt. E. G. Clerk, Major T. M. Owen, Dr. G. Oddin Taylor, Inspector O. Dimmick, Sergt. F. W. Stephens, Sertg.-Major Brace, R. F. Smithers, and H. W. Griffin.

Poultry Section.

The following were the officials for the Natal Poultry Club's Show, which was held in conjunction with the "Royal's":—

Mr. Dixon.—Brahmas, Cochins, Langshans, Hamburgs, Orpingtons, Rocks, Bantams, all game other than Indian. Steward, Mr. Martyr.

Mr. W. Chapman.—Minorcas, Leghorns, all varieties, and Andalusians. Steward, Mr. D. Wilkie.

Mr. C. Baylis.—Wyandottes. Steward, Mr. E. Baylis.

Mr. J. E. Servant.—Indian game, A.O.V. Chickens, and Cross Bred. Steward, Mr. Fairall.

Mr. D. M. Dixon.—Waterfowl and Turkeys.

Mr. G. H. D. Neaves.—Cats and selling classes in poultry section. Steward, Mr. W. Sandeman.

Combined Judges' Breeding Pens.—Mr. W. Sandeman.—Rabbits and Hares. Steward, Mr. G. H. D. Neaves.

Mr. J. C. Cope.—Trussed Poultry and Eggs. Steward, Mr. B. A. Ireland.

Mr. W. P. Gough.—Jacobins, Tumblers, Pouters, Frills, Magpies, Show Homers, Dragoons and Selling. Steward, Mr. Hopkins.

Mr. J. Munro Miller.—Fantails.

Mr. F. A. Smart.—Homers. Steward, Mr. W. A. Withycombe.

Mr. R. Fuller.—Cage Birds, all varieties other than Norwich and Yorkshire Canaries. Steward, Mr. A. Prior.

Mr. H. Clarkson.—Norwich and Yorkshire Canaries. Steward, Mr. D. W. Withycombe.

East Coast Fever.

AMENDED REPORT OF ADVISORY COMMISSION.

THE following is the amended report of the East Coast Fever Advisory Commission appointed under Act No. 20, 1910. A notice published in the *Natal Provincial Gazette* states that the late Natal Ministers were in accord with the recommendations of the Commission. The report is dated 27th May:—

The Commission sat on the 3rd, 4th, and 11th of March, and 27th May, 1910, and after discussion with the Minister of Agriculture (Mr. Deane), and on the last date with the Acting Minister of Agriculture (Colonel Greene), the Chief, Veterinary Division, and the Secretary for Native Affairs, came to the conclusions embodied hereunder.

It was felt that under the circumstances of the Parliamentary vote of £100,000 and the imminence of Union that the most important step to be taken would be to check the spread of East Coast Fever to new districts.

It was, accordingly, resolved, and the resolution forwarded to the Minister of Agriculture:—

“That the Government be strongly urged to at once concentrate all efforts towards fencing with all speed all known out-breaks of East Coast Fever, then branding all cattle therein. Subsequently, owners shall have the option to hand their cattle over to Government for slaughter, receiving compensation at schedule rates, otherwise, for the protection of surrounding clean areas, such restrictions as the authorities think necessary shall be imposed.”

The Commission recommends that all unfenced railway lines in the Colony should be fenced.

It is felt that if the above recommendations are adopted by the Government and actively carried out, further spread of the disease can be checked, and the task of eradication under Union much shortened and simplified.

The Commission cordially approves of Act No. 20 of 1910, with the exception of Clause 4, regarding which an alternative suggestion is hereinafter made, and he believes that the assistance thus rendered to farmers will be of the greatest service.

If, however, there is to be any hope of really controlling East Coast Fever, it is absolutely necessary to prevent the illicit movement of cattle.

This movement is chiefly carried out by Natives, and is the main cause of the spread of the disease.

Accordingly the following resolution was passed and forwarded to the Minister of Agriculture with the one already mentioned:—

“Resolved that the amount of £10,000 voted to the Natal Native Trust for East Coast Fever purposes be used exclusively and immediately on fencing and sub-dividing Native Locations. Should this not be conceded, the Commission hopes that no other steps will be taken pending the presentation of its report.”

The Commission deprecates the expenditure of any funds on other methods, until such fences are completed, when the other recommendations (branding and cleansing), hereinafter made, should, in the opinion of the Commission, be made compulsory and universal.

The extent of the sub-division of Locations referred to in the resolution would, of course, depend on the area, population, contour, water supply, etc.

It is further recommended that all fences around isolated outbreaks should be guarded or patrolled until such can be effectively dealt with, and, in addition, that the Natal Police or other body should be called out to thoroughly guard all unfenced outbreaks until such time as the fencing-in thereof can be effected.

The Commission is of opinion, in the event of the recommendations in regard to fencing being carried out, that, together with the assistance to be rendered to farmers under Act No. 20 of 1910, as much as possible will have been done in the direction of combating the disease by means of fencing.

The Commission, feeling strongly that illicit movement is the greatest source of danger, and must be stopped at any cost, urges the Government to initiate legislation for the compulsory branding of all cattle in the Colony, on the lines laid down in the Transvaal Branding Law of 1904.

This law, if backed up by severe penalties for contravention and illicit movement of stock, would certainly check the spread of the disease, besides being of great service in preventing stock thefts.

It may be urged that the Natives will object to branding, but experience proves that illicit movement cannot be stopped in any other way, and the exigencies of the case demand its prevention.

The Secretary for Native Affairs, in giving evidence before the Commission, said that he realised the necessity for branding, and that, though the Natives would look upon it with suspicion, he did not anticipate any serious difficulty, provided the matter was left to him to explain to them.

The cleansing (by dipping, spraying or hand-dressing) of cattle is finding greater favour daily, but it is still untried by a considerable

portion of the white farmers and by almost all Natives in the Colony.

Its importance is so obvious, and the drawbacks so few, that the Commission is of opinion that its adoption should be made compulsory.

This will be no hardship when it is considered that a dip can be erected for £50 or a spray pump purchased for 20s.

The regulations contained in the *Gazette*, and adopted on the 12th of May, 1903, by the Richmond Infected Area Advisory Board should be withdrawn, and the Commission recommends that regulations embodying the following suggestion should be applied to the whole Colony:—

1. It is required that all cattle in the Colony be kept reasonably free from ticks;
2. Stock Inspectors shall be required to inspect all herds in their districts as is done under the Scab Act, further assistance being rendered, where necessary, by other Government officials, duly authorised, such herds to be visited as often as the Department deems necessary;
3. In the event of any herd being declared by the Inspector to be tick-infested, the owner or person in charge of such herd shall be granted a license for thirty days, during which no cattle shall be removed;
4. At the expiration of this time, the Inspector shall again visit the herd, and if the cattle should be still infested, a penalty of £1 shall be imposed and the license renewed for thirty days, succeeding breaches of the regulations at similar periods being subject to an increasing penalty of £1 for each license;
5. Penalty for obstruction—see Clauses 2 and 16 of the Scab Act;
6. It shall be the duty of Inspectors to instruct Natives in Locations and on farms unoccupied by Europeans in the use of cleansing agents.

These suggested regulations provide the alternative to Clause 4, referred to on page 2 of this report.

In this regard, the Commission is of opinion that, in the interim until the above regulations are adopted, Stock Inspectors and other officials appointed should be instructed to refuse permits to remove cattle for any purpose whatever, unless they are satisfied that the whole of the applicant's cattle are reasonably free from ticks.

If the above recommendations pertaining to fencing, branding and dipping or cleansing are carried out, and all persons, including Natives, treated alike, the Commission believes that it is not too late to control the disease.

There remain some comparatively minor matters to refer to:—

MOVEMENT OF SLAUGHTER CATTLE FROM INFECTED VELD.

The Commission advises that movement of cattle from infected veld should be allowed over infected areas only, and in no case over veld which is clean or in process of cleansing.

DESTRUCTION OF STRAY CATTLE AND CATTLE ILLICITLY MOVED.

The Commission is of opinion that action in this regard be left to the discretion of the Department, it being believed that black and white will be treated alike.

It is recommended, however, that where it is found necessary to give Natives short notice to sell any of their cattle which may have strayed from clean farms, the Government should take them over at schedule rates, to save owners being victimised by unscrupulous buyers, as has happened in the past.

SUB-DIVISION OF FARMS BY THE MAIN LINE OF RAILWAY.

The policy of considering the main line of railway as a boundary across which cattle are not allowed to pass should, in the opinion of the Commission, under no circumstances be departed from, and should be extended to all branch lines when fenced, as recommended on page 2.

ONE DIPPING TANK FOR TWO FARMS.

The Commission is of opinion that this should be allowed where fencing is so erected as to preclude any chance of cattle mixing.

PROVISION OF TRUCKS.

The Commission considers that kraals should be erected by the Railway Department at all stations where cattle are trucked, as delay and danger often occur owing to trucks not being available.

MOVEMENT OF MEAT.

Great risk of spread of East Coast Fever is caused by the practice of Natives removing meat from animals which have died from East Coast Fever, to which portions of hide adhere.

The punishment meted out to offenders brought before Magistrates appearing to be inadequate to check the offence, it is suggested that the Attorney-General be asked to bring the seriousness of this offence to the notice of Magistrates.

MOVEMENT OF "SALTED" CATTLE.

Owing to the difficulty of ascertaining the immunity of such stock and the consequent danger of re-infection, the Commission cannot advise that this should be allowed at present south of the Buffalo River and the Tugela, from the junction of the Buffalo River to the sea.

CALVES FROM IMMUNE PARENTS.

A considerable number of farms are now clear of the disease, with

perhaps a few head of cattle remaining. As calves born from this immune stock will be susceptible to the disease, and so re-infect the veld, some method of dealing with the problem should be adopted, otherwise there will be danger of East Coast Fever becoming endemic, as is the case in German East Africa.

The whole question is a most difficult one, especially in the case of Natives, and yet is one which must be fully and firmly dealt with.

Your Commission is not yet, however, prepared with a recommendation, but will consider the matter further at an early meeting.

The Government is advised to consider the question of purchasing and removing a quantity of breeding cattle to comparatively safe areas, such as the Game Reserve, with a view to re-stocking depleted portions of the Colony, when this can be done with safety.

(Sd.) EDWARD W. EVANS,

Chairman.

A sure remedy for ewes refusing to suckle their own lambs, or other lambs, for that matter, writes a Canadian correspondent of an English paper, is to place them in a stanchion made of two eight or ten inch boards, so placed that the ewe's head is held, and that she cannot turn to smell the lambs. In three days a ewe will be kind to the lamb or lambs. It seems, as the lamb feasts on her milk for these few days, the smell becomes satisfactory to the mother.

WHAT IRRIGATION DOES.

It reclaims arid wastes.

It makes a prosperous country.

It causes the desert to blossom.

It ensures full crops each season.

It makes poultry-raising inexpensive and particularly profitable.

It multiplies the productive capacity of the soil.

It destroys insects and worms and produces perfect fruits.

It creates wealth from water, sunshine, and soil.

It makes the farmer independent of rainfalls.

It yields surprisingly large returns to investigators.

It makes possible the production of choicest fruits.

It gives arid lands great advantage over rainfall areas.

It will increase threefold the value of lands having rainfall.—

Poultry and Farm.

Division of Entomology and Horticulture.**SEVENTH REPORT.****REVIEW OF THE YEAR 1909-10.**

THE first six months of the year under review were fully occupied in connection with the Departmental export of citrus fruits. The final shipment of the 1909 season was made on 26th August, and it was not until the end of the year that all accounts and other matters pertaining thereto were finally adjusted.

During the past five months an effort has been made to recover some of the ground lost owing to the years 1908 and 1909 being almost wholly devoted to matters relating to fruit export, and some enquiry has been made into the present status of the insect pests and other troubles of wattles.

Experimental citrus export upon an extensive scale has now been undertaken over three seasons, 1907, 1908, and 1909. Throughout, the Government has been the moving spirit, supplying the funds to enable the first and conducting the second and third. Financially the first and third seasons' shipments can only be described as bitterly disappointing; the second series of shipments were of moderate dimensions, local conditions were favourable and the market was receptive, hence it was successful. So much has already been written and said upon the matter that it is not intended to overburden this report with any further discussions, but rather to place on record those conclusions which I have arrived at regarding this important subject.

I would premise by saying that the actual loss to fruit-growers has been largely magnified and frequently enlarged upon for specious reasons. Those fruit-growers who have lost have not lost more than the actual fruit, and when one comes to consider the losses of pioneers in fruit export in other countries, growers here have rather to congratulate themselves than otherwise.

Where considerable loss has taken place it has occurred through ill-advised and often rash speculation, and to this feature much of the loss to growers can also be attributed.

The experiment has been a costly one to the Government, but when the results are dispassionately reviewed it will be found that they are such as to justify the experiment and its cost.

It has to be borne in mind that citrus growing in Natal had become quite extensive, with a minimum of trouble, of culture and expense, the

industry paid and one after another was encouraged to embark upon it. But as time went on not only did other supplies destroy the almost complete enjoyment of the monopoly of a good market, but that market also became depressed. Indeed, it may be said with some justification that citrus culture upon the coast at any rate had reached a crisis. Thus it became imperative to seek some other outlet for the crop. There was every reason to believe that our naartjes would prove acceptable upon the European markets, and it was decided to test them upon a fairly large scale.

As the upshot of three extensive trials, it can be at least said that to-day we know fairly exactly where we are in regard to citrus culture and citrus export, and are in possession of facts which might otherwise have taken many years to establish, and then, perchance, not altogether satisfactorily. If in no other direction, this Division has at least established a record as regards packing, and with its demonstrations and the standard set up, the Natal citrus grower has no excuse for putting badly packed fruit upon any market.

The results of the experiments may be generalised as follows:—

I.—NAARTJE EXPORT.

The hopes so long entertained of building up a large export of naartjes give no promise of speedy realisation, and it is questionable whether at any time the trade in this fruit will reach anything like the dimensions of fruit export lines of other countries.

It can be said with much justification that, for some time to come, the prospects of export do not warrant any extension of the area under this fruit. In fact, with proper management, the existing naartje orchards will meet export requirements and local consumption for some years to come.

So far as really profitable prices for fancy and selected naartjes are concerned, the London market is limited to what can only be regarded from the export point of view as a very small affair. The unfortunate feature, from a local point of view, is that the summer fruit season in London coincides with the time of arrival there of the bulk of our crop. The heavy expenses involved in placing the naartje satisfactorily upon a so distant market, expenses which are not likely to diminish for some time, require that the fruit fetches fancy prices to make shipment worth the while.

What can be said with assurance is that shipments of one to three thousand trays per week, timed to arrive before and up to the advent of strawberries and cherries, will prove very profitable. Subsequently, when naartjes are most abundant and cheapest here, shippers must be very circumspect in sending any quantity forward lest the fall in prices, bound to come about, swallows up in expenses even their earlier profits.

II.—COAST ORANGES.

The export of coast-grown oranges is proved too hazardous. This fruit is exceptionally delicate and will not stand the strain laid upon it. Taken as a whole, coast oranges, whilst of exceptional flavour, are, furthermore, not up to export standard. Our experience in this connection is by no means exceptional, and in other countries where citrus are grown under similar climatic conditions the same weakness has been observed. By attention and manuring both size and colour can be improved, and it is equally probable that their carrying qualities may be enhanced.

III.—LEMONS.

The oversea export of lemons was sufficiently demonstrated unprofitable. However, in the culture of lemons for South African markets there is room for extension, but in this pursuit up-to-date methods in handling and curing are absolutely essential. Common rough lemons should be generally abandoned, and have no place in any commercial orchard.

IV.—MIDLANDS ORANGES.

The export of up-country oranges, speaking more particularly of those grown in the Richmond, Maritzburg and Greytown belt and further inland, has been attended with very satisfactory success, and orange culture in these regions will stand extension for export purposes, particularly as regards Navel oranges.

These oranges even under the many disadvantages of last season carried with promising success, and the prices obtained justify the continuance of their export.

CENTRAL PACKING HOUSE.

The chief feature of the Departmental export was the establishment of a central packing house in Durban, where citrus fruit from all parts of the country was sized, graded and packed. The establishment of this institution as a temporary measure was fully justified by the circumstances of 1908, but the packing of fruit for export in one centre was never seriously entertained, nor was its continuance through a second season deemed advisable. However, the experience gained in 1908, when every circumstance tended to make this experiment a success, seemed to show that this method was to some extent feasible, but under the strain and conditions of the 1909 export it broke down altogether.

It may safely be stated that such an institution could never be made self-supporting under existing conditions—conditions which are not likely to change—and further that the system, entailing as it does so many handlings of the fruit, is one that has very properly been abandoned. Central packing houses upon a co-operative basis in the midst of districts devoted to orange culture may become desirable in time, but anything of the sort for naartjes cannot be recommended.

CITRUS ROT FUNGI.

In connection with citrus export and bulking very largely as drawbacks to its success are the fungi generally known as "Blue Moulds."

Until recently it has been generally believed that the decay in transit of citrus fruits was due to the action of a fungus known as the Blue Mould of citrus fruits (*Penicillium digitatum*). The recent mycological investigations of Mr. Pole Evans have, however, thrown much light upon the matter by the discovery of a further form of decay which he has described as *Diplodia natalensis* or Black Rot. In our 1908 export we were certainly not troubled by this disease, and as a consequence the extraordinary amount of wastage occurring in the 1909 shipments were inexplicable, upon the assumption that *P. digitatum* was the destroying agent.

Although both of these moulds are dependent upon some surface injury to the rind to gain access to the fruit, the latter fungus may not show superficially until 10 to 15 days after the fruit has been affected. Further, fruit is subject to natural infection after it has been plucked even so long as ten days.

It was not until the packing season was well advanced that it was clear to me that either some further organism was to blame for the wastage reported or else the common mould had developed an abnormal character.

Those who visited the packing house during the latter part of the season are aware of the extraordinary precautions that were taken to eliminate the mischief by inspecting all fruit three or four days after packing and re-packing before lidding. By this system the wastage in transit was reduced immediately and almost eliminated.

During Mr. Evans' visit to Natal I gave it as my opinion that, in the case of naartjes, I felt convinced that the fungus often gained an entrance through the cut surface of the stalk. In the case of *P. digitatum*, it is safely assumed that this fungus only gains its entrance through rind abrasions, and practical experience bears this out. Whether or not it can be demonstrated that the *Diplodia* can only gain its entrance through a rind abrasion, the fact remains that in the majority of cases throughout my experience every appearance indicated that the fungus had entered through the cut stalk.

In any case, however, this Black Rot is of a far more dangerous nature than Blue Mould, and calls for very particular attention.

From the information I have been able to collect, the trouble is of long standing, but its attack and prevalence is subject to seasonable influence. There is every reason to believe that the late rains of 1909 had considerable bearing upon its ascendancy. It is generally conceded that these late rains do affect the keeping qualities—or rather the carrying

qualities—of naartjes, making them more tender, but apart from this they also distribute the spores of the fungus more generally, spattering them up from the soil with dirt into the trees.

That Black Rot is more prevalent in some orchards than in others there is little doubt, and, so far as I can ascertain, it is practically confined to the coast.

If for no other reason the prevalence of this disease calls for the abandonment of centralised packing upon the coast.

PINEAPPLE EXPORT.

Apart from the first series of experiments early in 1909, which has already been fully reported upon, a second series of shipments was made with a view to clearing up some of the points at issue.

The following particulars refer to a series of three shipments of pineapples packed and sent forward by me to London. These shipments were by the R.M.S. "Carisbrook Castle," 18th February, R.S.M. "Armadale Castle," 24th February, and the R.M.S. "Norman," 4th March; the fruit was sold upon the 13th, the 20th to 22nd and the 27th to 29th March, respectively, the sales being effected through Mr. T. J. Poupart, of Covent Garden, and Messrs. Mitchell, Cotts & Co.

The terms of shipment were the same as those extended in December last, the Government paying for freight, boxwood and packing and handing the London proceeds over to the growers who supplied fruit. The experiments met with scarcely any sympathy or support from the growers.

BOXES AND PACKING

It will be remembered that in the first experimental shipment a scratch box was used which held a dozen one-and-a-half-pound pines, packed in two tiers or layers. This double-layer packing was so condemned over the cables that I supplied myself with single-layer cases for these shipments, manufactured locally, some being of imported white wood sawn in Durban and the others of wattle wood and made up by the Harden Heights Wattle Company. In view of the full analysis I was able to make of the results of the first shipment, it is now a pity that in these later shipments a further trial of 2-layer parcels in cool chamber was not made; if, for no other reason than to confirm the result arrived at that pines in two-layer parcels carried satisfactorily in the cool chamber.

For the small pines I used a box measuring 22 x 25 x 5 inches over all, and for the large Cayenne pines a partitioned box measuring 40 x 20 x 7 inches over all.

Made up the small white wood boxes cost 1s. 4½d. each and the wattle wood 10½d. each, delivered at the Point. The large white wood cost 1s. 10d. each and the large wattle wood 1s. 4d. each delivered. The

wattle wood boxes I found to be quite equal to the white wood for pines, but let me say at once that unless the wattle wood boxes can be made and delivered at half the price they were, growers will have to fall back upon imported boxwood for exporting pineapples, for the simple reason that box boards of the best quality with printed ends can be landed in Durban duty paid at 4 3-10d. per set in the smaller size, and, of course, can be carried some distance by rail and put together at under 6d. each. I have not a quotation for the large boxes, but, upon figures before me, I am justified in putting imported boxes in at 9d. each.

The pines were wrapped in what is known as butter-paper, or in common paper bags, and fine, best quality wood-wool was used as packing. I have already indicated that cshredded mealie husks make an excellent packing for pines, and as wood-wool costs up to £12 imported direct and £20 per ton purchased from local agents, it will be seen that a vast saving can be effected by using what is at present a waste product in Natal. Further than this, mealie husks are used for the Azores pines and the fine wood-wool has proved injurious right through our experiments. Moreover, I gather from a report before me that in a series of shipping experiments conducted in Hawaii the shredded mealie husk ~~has~~ proved the better packing. It will be noted from the Commercial Agent's reports that wrapping the fruit is considered to be unnecessary, but he advises wrapping the crowns. As a packer of pines I would prefer to always wrap them.

THE "CARISBROOK" SHIPMENT.

The "Carisbrook" shipment comprised 20 boxes of small pines (18 of 12 fruits and 2 of 14 fruits), 18 large boxes of Cayennes (1 of 6, 8 of 8, 2 of 10, 5 of 12, 1 of 14, and 1 of 16 fruits), also 1 large box containing 6 small Cayennes and 7 Queens), all in cool chamber.

It is necessary to point out here that this shipment was made before Mr. Harrison's report upon the preliminary shipment had come to hand, and, whilst I had already determined upon not shipping any green pines by cool chamber, some pines about three-parts coloured were shipped. Having the opportunity in the meanwhile of analysing the above-mentioned report, in the two latter shipments no off-colour pines were included.

There are two other features of the shipment which have to be dealt with in order that the result may be clear. One gentleman who, I understand, has been shipping large Cayennes with a fair amount of regularity to London, asked me to send some of his fruit in the same condition as he himself was shipping, with a view to ascertaining whether better prices would be realised upon Covent Garden market than he was realising by placing the pines elsewhere.

Another gentlemen was anxious for me to thoroughly test a preserva-

tive dressing, and in three shipments sent forward there were a number of pines sent which he treated himself.

It is, therefore, necessary for me to present an analysis of this report under several sub-headings.

COMPARATIVE TRIAL.

Fifty-eight Cayennes: 3 boxes of 8, 2 of 12, 1 of 10 fruits each. These fruits when sent to me were for the most part far more backward in colour than any others packed, and with a view to saving freight they were packed much more tightly than is the practice of the shipper upon whose behalf the comparative test was made. Of these fruits 5 arrived too green, 6 green, 16 greenish, 3 fairly ripe, 14 ripe, 3 fully ripe; 6 bruised, 2 specked. It is, therefore, seen that the pines arrived practically as packed, ripening up somewhat before coming under the influence of the cool temperature. Half the bruising occurred in one of the 8 packs, and I do not think it was due to too tight packing. In one case of 12 pines, which was tightly packed, the 3 pines suffered, and the crowns bent in packing would not straighten afterwards. Ten of these pines were "greenish," and that the crowns would not straighten is very probably due to this fact. With regard to the tighter packing, I may say that I was able to effect a saving of 50 per cent. in freight thereby.

The following table shows the state when packed and condition on arrival of the fruit.

Mark.	No. of fruits	Condition on arrival.	By Sales. s. d.	
			s.	d.
D 1.	8	2 ripe, 6 greenish ...	8	0
D 2.	8	5 too green, 3 fairly ripe ...	8	0
D 3.	8	3 bruised 2 green, rest ripe ...	8	0
D 4.	10	7 sound, 2 specked, 1 green ...	12	6
D 5.	12	10 greenish, 2 ripe ...	9	0
D 6.	12	2 over-ripe, 3 green, 3 ripe, 4 bleeding;	9	0

Commenting upon these pines the Commercial Agent says: "Pines will not sell upon this market in a green state."

PRESERVATIVE TEST.

In this shipment I overlooked informing the Commercial Agent that certain pines had been submitted to a preservative treatment, so that his report thereupon is quite impartial.

The treated pines were Cayennes, 1 case of 16 and 1 of 14 pines; these were ripe and well-coloured when shipped. They realised 6s. and 7s. per case respectively, or 4½d. and 6d. each. The following comments are made by the Commercial Agent:—

"Sixteen case, pines fully ripe and reddish colour. Nearly all specked and some mouldy; one or two showing green patches. Some of

the crowns double the size of pine; rather too big. Somewhat too ripe on being packed. Fourteen case, majority with mildew on outside, only 6 first-class fruits." It will be found from the reports upon the later tests with this preservative that treated pines always became mildewed upon the outside, and invariably arrived in a worse condition than the untreated pines.

SMALL CAYENNES.

Three cases of small Cayennes weighing just about 2 lb. each and fully ripe when packed were well received, realising 8s. per dozen, despite the fact that four were rotten, and nine "specked." From the Commercial Agent's comments, I gather that this is an acceptable fruit, and there is no doubt they were shipped too ripe. The price realised should be quite profitable, as Cayennes of this grade cost no more to forward than "Queens."

CAYENNES THREE-PARTS COLOURED.

This lot of pines were on the whole only three-parts coloured; some, however, were fully ripe. They were not sent forward to me very carefully packed, and some so crushed that I had to reject them altogether. In all they numbered 38, 6 being 5 to 5½ lbs. and 32, 4 to 4½ lbs. in weight. Four of the 5 lb. pines realised 1s. 6d. each and 2, 1s. each. Of the 4 lb. lot 8 fetched 1s. 3d. each, and the balance 1s. each.

WINKEL SPRUIT EXPERIMENT FARM CAYENNES.

No instructions regarding picking and packing were issued to the Manager of the Experimental Farm, and throughout the experiments these Government pines have been treated by me as from an ordinary grower. The pines were received in a fairly well-coloured condition, which had been acquired upon the plants. Report:—

No. 1 case. 8, 4 to 4½ lbs. pines: "Arrived; 6 good, 1 bruised, 1 fully ripe. Had a warm, even colour which makes a fine fruit, realised 1s. 4d. each.

No. 2 case. 10, 3½ lbs. pines: "Although a little green, a very good case. No fruits bruised, realised 1s. 6d. each."

No. 3 case. 6, 2 to 2½ lbs. pines: "Very fine, even coloured, sound, realised 7s. per dozen."

One other lot of 4 to 4½ lbs. pines which arrived in good order realised 1s. 6d. each, but the majority of the pines only fetched 1s.

Altogether 147 Cayennes were forwarded for sale, including those already commented upon under "Special features," but only 100 were in a fit condition for sale, and these fetched 1s. to 1s. 6d. each, according to size and condition. Upon condition alone the Winkel Spruit pines realised 1s. 4d. against 1s. for pines of equal size but less carefully handled.

SMALL NATALS.

The prices realised for small Natal's proved more satisfactory upon the whole. As will be seen upon reference to mark x in the subjoined table, the Experimental Farm pines again scored.

Mark.	No. of Fruits.	Weight.	Condition when Packed.	Commercial Agent's Report.	Prices.
X1	12	1½	Sound and bright NOTE.—Pines at 1½ are over that, but under 2lbs. Pines at 1½ nearly 1½. Pines at 1½ nearly 1½.	Bright crowns; best fruit of any. All evenly coloured and bright	s. d. 7 0
2	12	1½	...	Perfect condition, bright; good crowns	7 0
3	12	1½	...	Bright, excellent crowns; all good; splendid condition	7 0
4	...	1½	...	Very attractive; crowns all bright and good fruits	6 0
5-8	12	1½	...	Excellent; perfect condition, good crowns; all realised 6s. per dozen	6 0
9-10	12	1½	...	Excellent; perfect condition; good crowns; both realised 5s. per dozen	5
GG A1	12	1½	Nicely coloured	A clean looking Pine, very nicely coloured indeed; sound	6 0
2	12	1½	" "	Very pretty colour; one or two bruized; nice sized fruit (see special features 3)	6 0
G1	16	1½	Scratch case	Dirty looking lot, although of fairly good colour; crowns crushed; fully ripe	5 4
G2	16	1½	Coloured	One rotten; excellent case otherwise	5 4
G3	16	1½	"	Good case; one reddish colour	6 8
G4	18	1	"	Good case and even eyes, also colouring; good crowns	6 0
5	18	1	"	Good case; crowns, fruit and colour nice and bright	4 0
H H	18	1	Coloured up	(See special features 3)	5 6
G D	10	½lb	Bright Baby Pines	" " 4, 60 fruits at 2½ each	13 0

"ARMADALE" SHIPMENT.

The "Armada" shipment comprised 40 boxes and six trays of small Natal pines and 16 boxes of Cayennes.

Special Features

1. MARITZBURG CAYENNES.—These pines were received at the Point upon the 17th of February, but were so backward in colour that I decided to keep them over to see if they would colour up sufficiently. This procedure was not altogether very satisfactory as some of the fruit had been picked in too backward a state to colour well. The best were selected

and forwarded on the 24th, that is about a week after they were gathered. These pines are remarkable for their comparatively small crowns, and are popularly spoken of as "King pines," although only a variation of the ordinary Cayenne. They seem to possess a marked tendency to leak their juices. This is, of course, a feature of all our large Cayennes, but it is more pronounced so far as my experience goes in this type. There were three cases of 10 fruits each sent, two of which realised 10s., and the other 4s. 6d. the case, the pines weighing about $4\frac{1}{2}$ lbs. each.

The following are the reports upon the three cases:—

No. 1. Rather small crown, though satisfactory. Eight good condition, fully ripe. Majority evenly coloured, except two, showing a little green. Two leaking, but fair consistency.

No. 2. Eyes rather green, all fairly even, warm colour, two slightly bleeding, and one bleeding badly at stalk.

No. 3. Very good colour, two greenish towards crown, three sweating.

2. PRESERVATIVE TESTS.—

(A) One case. Pines treated and packed on 20th February and shipped on 25th. This case was sent to the Commercial Agent with the following statement:—

"These fruits will have been fully ripe for seven days before being placed in the cool chamber. I would like you to report fully upon their condition on arrival, and if they are sound will you please keep several of them by you with a view to ascertaining how long they will keep after coming out of the cool chamber."

Report.—"One absolutely rotten. All the crowns yellowish and ragged. Fruits showing mildew on the outside. Opened one at once, dead ripe but sound inside, very juicy, flavour delicious. All the fruits of deep red somewhat over-ripe colour of a sodden appearance, also dark-looking in patches."

(B) One case. Four pines treated, four untreated. Pines fully coloured and fresh when packed. Maritzburg type.

Report:—

Untreated: "Deep eyes, small crowns, good, looked quite ripe, even colour."

Treated: "Good crowns, deep eyes, good stalks, not so evenly coloured. One bruised and bleeding, another bleeding slightly, two good condition, but all quite ripe enough. Will report further." The treatment seems to have made no practical difference.

(C) Two cases, 10 each.

Report:—1st case. "Fruit and original colour good, but greasy looking. Crowns very nice, and size well liked. The preservative cannot be too strongly condemned. It destroys the appearance, the mildew

having to be wiped off, and seeing this no person would be inclined to buy, however good and sound the fruit is inside."

2nd Case. "Four of the pines compare in evenness and colour to the Azores, and if of a less sodden appearance (? preservative) would have been just as attractive. This preservative is fatal to the appearance on opening up. If the pines can be guaranteed to land here in this condition (without preservative) there is not much doubt that they will eventually compete not only on fair terms, but on better, with the Azores, by reason of superior flavour of the Natal-grown pine."

In a number of other cases of treated fruit the treatment calls no comment, except two, in one of which 10 out of 16 were unsaleable, and in the other 9 out of 14.

3. A COMPARISON. Two packages of small Nats ripened to a golden yellow on plants gathered on the 19th, packed on the 20th, and placed in cool chamber on the 25th for comparison with one case of pines picked in the green-black stage and allowed to colour up. These pines took six to seven days to colour sufficiently and acquired a fairly good colour, but the eyes were pointed and the bracts of the eyes somewhat withered.

Report:—"The pines allowed to colour upon the plants and packed and held back five days on opening up proved: No. 1 case. Very pretty in colour. One or two bruised. A nice sized fruit (about 1½ lbs.). This or a little bigger (2 lbs.) is the size that should be arrived at for a large regular trade. No. 2 case. Clean looking pines, very nice colour indeed. Sound."

The pines coloured from green-black stage are reported upon as follows:—"Very pointed eyes. Sound condition, but somewhat dirty looking. Colour dull undecided yellowish red. Crowns fairly good. No comparison with above." The former pines realised 6s. per dozen, the latter (only 1½ lb. in weight) fetched 3s. 8d. per dozen, but cost 25 per cent. less to place upon the market.

4. *Baby Pines*.—Four fruit boxes holding 26 fruits each and six 3 inch trays holding 10 fruits each of ridiculously small pines of a nice bright colour but not weighing more than half-a-pound each were sent with a view to ascertaining whether these ratoon pines would realise a sufficiently profitable price if shipped in trays, it being thought that they might sell to costers and flower girls. Those sent in the cases were very tightly packed and suffered considerably on this account. Those sent in trays were unwrapped and without packing and arrived generally sound, and are reported upon as pretty looking pines, a fact due to better ventilation and absence of jamming in packing. Upon those in trays Mr. Poupart reports that he could sell them in small quantities at about 3d. each, but would not recommend very large quantities. This, of course,

would be very profitable, but there is nothing to be gained in supplying a particularly limited market.

SMALL NATAL PINES.

The following tabular statement will convey the best idea of the results of shipping. Mark x are pines grown at Winkel Spruit Experimental Station. The prices realised, except in six cases, were quite unprofitable, and, in comparison with those of the former and later shipments, equally inexplicable:—

Mark.	No of Fruits	Weights	Condition when Packed.	Commercial Agent's Report.	Prices.
X 1	12	1½	Coloured uniformly	Very good ; two slightly specked	s. d.
2	12	1½	" "	Mostly sound and evenly coloured; attractive crowns on big side, could, with advantage, be smaller	3 0 6 0
3	12	1½	" "	"	3 0
4	12	1½	" "	Eight excellent pines, four specked	3 0
5	6	2	" "	All excellent, except one specked	3 6
G G 1	12	1½	Uniformly well coloured when picked	Nine good, three specked ; appearance very fair	3 10
G G 2	12	1½	" "	Majority good ; several gone or specked ; all fully ripe, and of very fine appearance.	3 10
G G 3	12	1½	" "	"	3 10
G 1	14	1½	Specially coloured	Good " condition " and colour, except two	3 0
2	14	1½	" "	Eight good, one specked, and five unsaleable ; even colour and bright	3 0
3	12	1½	" "	Two specked, condition and colour good	3 0
4	12	1½	" "	Three specked, two rotten, seven good	3 0
5	12	1½	" "	One bad ; rest in excellent condition ; crowns a very nice size	6 0
6	12	1½	" "	Six good, four specked, two rotten	3 0
7	12	1½	" "	Six specked ; all good even colour ; pretty good crowns	3 0
H 1	12	1½	Coloured	Nine good one rotten, two specked	6 0
2	14	1½	"	Four specked, ten good	5 0
H 3	12	1½	Yellowish	Good as to crowns and colour ; a little greenish	6 5
H 4	12	1½	"	Excellent condition ; all good	10 0
D 1	12	1½	Coloured	One specked, one greenish ; good crowns and appearance	4 6
2	12	1½	"	A fairly good case, a few specked, of nice bright appearance.	4 6

"NORMAN" SHIPMENT.

The "Norman" shipment was made up of 76 cases of pineapples.

Amongst these one package of 12 pines was forwarded to Dresden for private report. The pines were all about two pounds each in weight and well coloured. They were sent by cool chamber and arrived at their destination about a week from London. The pines had gone off somewhat, but were in fairly good condition and valued at three to five shillings each.

The following are the special features of this shipment:—

1. Three cases containing 28 Cayenne pines, which had been picked on the green side and allowed to colour up for six days after packing, were sent by cool chamber for comparison with two cases containing 16 similar fruits from the same plantation which had been allowed to colour upon the plants.

The result of this experiment was all in favour of the pines which after packing had coloured up before being placed in the cool chamber. They had coloured more evenly than those in the plants for one thing, and curiously enough the crowns were greener and fresher than those of the latter.

2. Seven small cases containing 18 and 20 fruits which were slightly dried when packed were shipped by cool chamber with a view to ascertaining whether it was practicable or desirable to "cure" ripe pines a little before shipment. The report states that all the fruit arrived sound and of bright colour.

3. Twenty-one cases of 12 each of small Natala grown at Winkel Spruit and running about $1\frac{1}{4}$ lb. each were sent in cool chamber slightly under colour—that is well but not highly coloured and were regarded as fine and all round samples as it was possible to get.

These are reported upon as follows:—

"An attractive, clean pine though a dull colour. Arrived upon the whole in splendid condition and fresh. The crowns excellent. A pine that sells well but should be a little bigger, say, 2 to $2\frac{1}{2}$ lbs." These cases averaged 5s. each, eight realising 4s. 4d. each, eight 4s. 6d., four 6s., and one 7s. *Note:* For cool chamber shipment these pines could have been held back a week.

4. Quoting from my covering letter to the Commercial Agent:—
"In the ventilated hold there are 15 cases of small pines and one of Cayennes. A number of the "Small Natala" approach the Cape pine in their small size and smallness of crown. If my local experiments go for anything these latter packed quite green should arrive well coloured, but perhaps a little on the withered side. The large box of green Cayenne pines I do not expect to carry, and will not be surprised to hear they are quite bad on arrival."

The following is extracted from Mr. Harrison's report:—

"The box of Cayennes ex ventilated hold was thrown away. There were black patches all over the fruit and the crowns were ragged and shrivelled. Although the pines were firm to the touch they were black at the core in almost every case. The small pines by ventilated hold arrived in splendid condition and of a bright reddish colour. The crowns were in general good and only a little discoloured at the tips." This fruit realised an average price of 4s. 5d. a case. Twelve boxes of 12 fetched 4s. 6d. each, one of 18 fruits 6s., and one of 24 fruits 5s., one case fetching 2s., the fruit therein being discoloured.

The following statements give general particulars as to the condition of fruit when packed and upon arrival. The packing material was in all cases wood-wool:—

i. CAYENNE PINES IN COOL CHAMBER.

Mark.	No. of Fruits.	Weights.	Condition when Shipped.	Commercial Agent's Report.
D	8	lbs. 5½	Coloured up for six days after packing; in good condition, and carefully packed	Fully ripe; several bruised; good crowns; fairly deep and even colour
D	10	5	" "	Beautiful colour on upper side; one rotten; others mostly specked or bruised
D	10	5	" "	Colour good, but better on one side than other; fully ripe; one bleeding badly
G D	8	5½	Coloured up on plants packed and shipped at once; all in good condition	Good class of fruit, but uneven in colour; crowns a little yellowish; nearly all bruised; one bleeding badly; one rotten
G D	8	5½	" "	Even coloured; fresh appearance, but not so brightly coloured as D; a number over ripe
G	8	5	...	Lot G.—Most of this lot of Cayennes had been carelessly handled, and badly forwarded to the packing house. The fruit was ripened upon the plants, and was not uniformly coloured
				Four cases; condition not good; treated with secret preservative
				Out of the 24 fruits only two arrived sound. The remainder arrived bruised, bleeding and musty
G	8	5½	Eight fruits from lot G; four treated with preservative; four untreated	The four untreated pines of good colour on one side. They were firm but sweating a little. The other four all specked and mildewed.

The following statements give general particulars as to the condition of fruit when packed and upon arrival. The packing material was in all cases wood-wool—(*Continued*):—

G	8	5½	Specially selected from Lot G, but not treated with preservative	A good case; firm fruit and dry; the best condition on the whole, and most attractive of those sent
G	10	5	Six cases. Typical of Lot G	At least 50% unsaleable except as specks; many bruized and over ripe
G	12	4	Six cases. Typical of Lot G	A bad lot on opening up
G	14	3	One case of Lot G	Five in fair condition; three mildewed; crowns crushed
G Y	8	5½	Three cases of ripe and well coloured pines; over ripe when packed; not treated with preservative	This fruit all arrived in an unsatisfactory condition, mostly bruized, bleeding, or mouldy

ii. SMALL NATAL'S IN COOL CHAMBER.

Marks.	No. of Fruits.	Weight.	Condition when Shipped.	Commercial Agent's Report.	Gross Receipts
X	12	1½ lbs.	21 cases of 12 pines each from Winkle Spruit Expt. Farm. Coloured on plants to a yellow colour; quite fresh. Lot G, 11 cases of smallish pines, not well nor carefully handled; forwarded without particular selection; some treated with secret preservative	An attractive clean pine, though a dull yellow; arrived on the whole in splendid condition; crowns excellent; a pine that sells well, but should be a little bigger; say 2lbs. to 2½lbs.	s. d. ... Average 5s. per case.
G	12	1½	Two cases of 12 each; specially selected and not treated with preservative; well coloured.	Nice looking fruit and good crowns; slightly specked.	6s. per case.
G	18	1½	Full coloured; treated with preservative (1 case)	Two specked, dirty looking, and all rather soft to touch; crowns withered	9 0
G	20	1	Two cases; fully ripe; treated with preservative	First case—Two rotten, others mostly mildewed, probably caused by "cure" Second case—Fruits over ripe, the "cure" gives a filthy appearance; all soft	Average, 4s. 4d.
G	20	1	Six cases; not treated with preservative; all well coloured and ripe	Arrived all fully ripe and in much better condition than above	

iii. SMALL NATALS IN VENTILATED HOLD.

This lot, consisting of 15 cases of green fruits purchased upon the market, was graded out in accordance with size and appearance and forwarded by ventilated hold.

Marks.	No. of Fruits.	Weight.	Condition when Shipped.	Commercial Agent's Report.	Gross Receipts
		lbs.			
F	12	1 $\frac{1}{2}$	13 cases of 12 fruits	All 15 cases opened up of a bright reddish colour; arrived in splendid condition: the following are notes on each case:— 1 Sound; good conditioned crowns: one fruit "specked" 2 Nice crowns, but little discoloured and weak; fruit sound; a few specs 3 A number specked; one rotten 4 } 5 } Excellent cases; good stiff 6 } crowns, and only a little discoloured at the tips 7 } 8 } 9 } 10 Very good case; bigger crowns and firm 11 Three fruits slightly discoloured 12 } Very good; crowns much 13 } more attractive, and better condition than Capes 14 Case of 18 pines; all sound; bright colour 15 Case of 24 pines; very small; all good	Average, 4s. 6d. per case
	18	1 $\frac{1}{2}$	1 " 18 "		
	24	1	1 " 24 "		

CAYENNES.

Condition on Arrival and Prices.

The prices realised for the sound Cayennes were from 9d. to 1s. 6d. each, and the condition upon arrival very much the same as packed. What is so pronounced is that the pines which were picked, handled and forwarded to me carefully arrived sound, whereas in other lots bruizing and bleeding is a marked feature. The only Cayennes that were properly handled and carefully forwarded were 10 from Winkel Spruit. These weighed about 3 lbs. to 3 $\frac{1}{4}$ lbs. each and realised 1s. 4d. each; these are reported upon as follows:—

"Very fine even colour, splendid crowns and sound fruit. A pine which should have a big vogue, if consistently good on arrival."

CONCLUSIONS.

It is so absolutely impossible to reconcile some of the features of the above reports in respect to the condition upon arrival and the prices

realised that I do not propose to attempt any explanation. The prices obtained for small Queens in the first and third shipments compare very well, but the gross returns of the second shipment destroy the confidence the others inspire. Taking the Winkel Spruit pines alone we find that in the first shipment they fetched 6s. and 7s. per dozen, and in the third an average of 5s. was obtained. The same fruit in the second shipment realised 3s. per dozen. But there are far greater discrepancies than these.

So far as Cayennes are concerned the prices realised, particularly in the third shipment, are so at variance with the reports that I can only conclude that the prices given in the official account sales bear no relation whatever to the packages against which they are set.

Otherwise the results are practically those arrived at in the first series of shipments. That is by sending selected pines of $1\frac{1}{2}$ to 2 lbs. in weight, which are well and carefully packed, a nett return of 2s. to 2s. 6d. per dozen may be expected.

3RD SERIES.

The 3rd series comprised two shipments, one of 136 boxes and one of 82 boxes shipped in August. These were made by special request and the senders looking upon the trial as "a practical one" and paying the expenses. All the pines, weighing $1\frac{1}{2}$ lb. and upwards, were sent from one field. Unfortunately these pines were forwarded as in all other cases to the Point for packing and had been injured in transit. Of course, detectable injuries were eliminated, but it is not always possible to detect all injuries received in transit. Again these pines suffered from black core or specking. The experiment was a failure and did not clear expenses, involving the loss of the boxwood and the value of the fruit. As an experiment, however, it was valuable as showing the necessity for shipping only carefully selected and well-grown pines.

GENERAL CONCLUSIONS.

The following conclusions may be said to be based upon practical experience, but they only take into consideration the series of shipments in which I have been directly interested, full particulars of which are given above or in my previous report.

There have been numerous minor private experiments made by as many individuals, but unfortunately those who make these experiments do not publish the results, and what little one hears about them precludes any possibility of arriving at a correct estimate of their value.

The question of pineapple export is, however, an important one and should not be lost sight of because no particular success has been achieved in the past. To my mind it can be made more important, I believe more permanent and remunerative, than naartje export.

Pineapple culture can hardly be said to be a good paying proposition in Natal to-day, and as an industry it is upon the whole a decadent

one. With few exceptions, and then chiefly by growers of Cayennes, little attention is given to advanced pineapple culture—a state of affairs largely attributed to continued disappointments.

Before pineapple export can be made a success and placed upon an assured basis, it is obvious to me that advanced methods and specialisation must occur in the culture of the Small Natal pine. In this connection I think we can safely leave out of consideration other varieties:

Generally speaking only two varieties are grown; these are the smooth-leaved Cayenne—a close relative if not identical with the Azores pineapple and the “Small Natal,” for which the name “Golden Queen” has been suggested. It is necessary here to point out that the term “Queen pine” is frequently attached to the large Cayenne, presumably, I suppose, because its large size gives it a regal appearance. A few gentlemen have imported and grown other kinds, of which there is a wide variety, but no remarkable results have been achieved.

It will be noted from the reports that a considerable number of Cayenne pines were used throughout the experiments, and it is well to mention that small lots of this variety are frequently shipped by various parties to London.

There are, however, so many drawbacks to the shipment of this kind that I do not presume to recommend it strongly as an export line. In the first place it is a fruit which must always be shipped by cool chamber, and our experiments have demonstrated three things in this connection. These are (1) that pineapples do not colour up in the cool chamber, (2) upon removal they do not colour up after being kept so long under the influence of the low temperature, and (3) the keeping qualities are considerably impaired—a feature which depreciates the market value at once.

As this variety does not colour up as does the small Queen if picked green, its shipment by any other means than cool chamber is out of the question. More than this, they do not colour up evenly upon the plants, and must be harvested for several reasons before they are well ripened. It was found that if fairly coloured when picked they will colour up quite well, a great improvement being effected if packed and allowed to colour under such conditions at the ordinary temperature.

The worst feature of this fruit is its tendency to “Bleed.” In fact the finest examples bleed sometimes most profusely. Our experiments showed that bleeding fruit came out of the cool chamber still bleeding, and also that bleeding would arise in the cool chamber. To my mind this feature alone makes the fruit undesirable for export purposes as it is one that cannot be guarded and so large a proportion are apt to start bleeding.

A further drawback is the uncertainty as to prices. With success

one may expect 1s. apiece as a steady uniform price for pines of the larger type ($3\frac{1}{2}$ to $5\frac{1}{2}$ lbs.) arriving in good condition. It will be noticed from the experiments that these fruits packed 8—10 and 12 to the box, the average pack works out at 10 to the package, which was 40 x 20 x 7 inches, or 12 boxes to the ship's ton. Otherwise, at 60s. per ton, the freight alone works out at 6d. per pine and the boxes at 1½d. per fruit.

As pointed out elsewhere, small Cayennes of 2 to $2\frac{1}{2}$ lbs. are exactly on a par with large Natal or Golden Queens, and may be expected to fetch 8s. per dozen, or a profit of 3s. to 4s. per dozen, which, if it can be maintained, is a very promising feature of the experiment.

However, what hopes there are to build one upon more solid foundations are in relation to the export of our Natal Golden Queen.

In the first place there can be no question that for export purposes improvement by selection, care and culture has to receive primary attention. That such is the case is illustrated in the Winkel Spruit lots, which were not specially selected but which were grown upon good principles.

It can be said at once that fit pines for export will only be obtained from "plant" and 1st ratoons. That is first and second crops. Not alone because of the size question, but what is more important, that is "specking." "Specking" is the external evidence of brown rot, and this trouble is less pronounced in "plant" and first year ratoons than it is in old plantations. There is no doubt that as the plants get older this disease gets worse, and it gets worse first because of debility, but more so because the fruit has greater opportunities of becoming affected.

Brown rot, as is well known, does not destroy the whole of the pine, but it ruins its appearance. It starts from the eye and drives inward to the core, and is due to a mould which is reasonably supposed to gain its entrance through the flowers, the spores being probably distributed by insects. It stands to reason that the older the plantation becomes the greater the ascendancy of this parasite.

"Specking" is a dangerous trouble, because it is not manifest in green pines and is frequently undiscernable in quite ripe pines. If my observations go for anything the cool chambering seems to bring it into more prominence as care was taken to eliminate pines which showed any indication of "speck" when packing, and yet many opened up badly affected.

A strong feature brought out by the experiments was that pineapples for export must be carefully handled. Indeed, it is of primary importance that they should be carefully picked and as carefully removed from the fields to the packing houses. Gloves should always be supplied to the pickers, not that the fruit can be injured by the hands, but that the hands being protected no accidents happen to the fruit. Further, I am satisfied that the fruit should be kept in single layers, or at any rate that a buffer

of grass or such-like soft material should be used between each layer when the fruit is being harvested and transported to the packing house. In short, I am sure it is easy to injure a pineapple sufficiently from the field to the packing house so that when it arrives in London that injury has become very pronounced. This applies in whatever stage the fruit is picked.

So far as shipment is concerned, there are two means of shipment, cool chamber and ventilated hold, and a grower can choose either or both, but he is limited each way by the stage of maturity of each fruit as indicated by the degree of colour manifest.

If the ventilated hold is chosen then certain considerations have to be taken in mind. The first of these is that the fruit must be picked dark green without any pale green or yellow showing and only a few days (three at most) before the date of shipment. That is if the steamer leaves on Thursday the fruit should be picked upon Tuesday. From all that I can gather, ventilated hold shipments must be confined to quite green fruit, harvested and packed within three days of shipment.

If the cool chamber is chosen the shipper is not tied down to so restricted a time limit.

What he must do in sizing his fruit, however, is to grade it out in accordance with the degree of colour, and he will find that he can make out about four colour degrees between the pale green and the full yellow of the matured fruit. If he does this he can do his packing uninterruptedly and ship his fruit after it has coloured up nicely, because he knows that it will open up at the other end of its journey almost if not exactly in that degree of colour which it attained just prior to being placed in the cool chamber.

Pineapples can be sized with little practice by eye and their grading is not at all difficult. Upon any indication of a damaged or diseased eye fruits should be rejected. It will also be found profitable in grading to put those with nice well-formed crowns together, making a selected package of them. They should always be cut with $1\frac{1}{2}$ in. to 2 in. of stalk, the larger Cayennes having 3 in. to 4 in. left.

No particular advantage comes of sealing the stalk ends, and it is far preferable to cut the stalks straight across and to the right length when harvesting than to cut roughly and trim up afterwards.

The leaves about the base should be pulled off and the pine dressed in that respect. Before wrapping the fruit should be brushed over, preferably with a good soft bannister broom so as to remove all grit, sand and dust. The whole, the crown and fruit, is best wrapped, as otherwise no matter how clean the packing material, a certain amount of dust is bound to filter in on the fruit. The dust and fragments in even the best wood-wool was found to give the fruit a dirty appearance.

The packing material should be coarse and springy; there are only two suitable materials, and these are wood-wool and shredded mealie-husks. A coarse wood-wool is far preferable to the fine, good quality stuff usually used for fruits, and which rather tells upon the fruit than favours it. If the fruit is wrapped, packing material is not necessary between the fruit, but a layer is required beneath and above and at the sides. The use of fine wood-wool and the use of too much interferes with the ventilation of the package and seems to cause sweating.

Only the clean inner leaves off the cobs can be used for packing, and even these are worse than wood-wool if not thoroughly shredded into narrow strips.

Miscellaneous Fruit Export.

SUMMER FRUITS.

The export of summer fruits from Natal is a matter which does not hold out much of a future. Our climatic conditions are such that fruits of good carrying qualities can hardly be produced. If any development is to take place I fear it can only be with early plums and late apples. Against even this is the question of hailstorms, whose very vehemence is unfortunately confined to our best apple and pear growing districts.

In connection with this particular vagary of the elements numerous enquiries have been set upon foot, but little if anything of value has been ascertained, and hail prevention seems, as ever, in the clouds.

Experiments are now in progress in connection with hail-guards for fruit trees and galvanised woven wire screens, after the pattern of the spring mattress, are under trial. These are at present very expensive, running to 20s. per tree; their effectiveness can, I think, be relied upon, but their durability is an open question.

A report has already been furnished upon a trial shipment of Methley plums to London and further shipments are arranged for next season. The original shipment, owing to the early appearance of the variety upon the market, proved most encouraging, and, in conjunction with next season's trial an effort will be made to increase the size of this local sort by heavy thinning of the crop.

Tropical Fruits.

In the export of Avocados and Mangos there appears to be, from the small experiments made, a promise of a remunerative if limited export, but both these lines require further exploitation.

The question of Banana export is one cropping up frequently both as regards the fresh fruit, dried bananas, banana figs and banana flour. For the present this is not a matter of moment. It is scarcely credible that fresh bananas will ever be exported from here to Europe, and with

the progress and growth of South Africa it will, I opine, be a very long while before banana culture here will do any more than meet the local demand, and so there will be no surplus to turn into either figs or flour.

LOCUSTS.

For the first summer during my term as Entomologist locusts have been a negligible quantity, no damage having been done by either fliers or hoppers. Early arrangements were made to meet any possible hatching of hoppers, supplies being dispatched to depots throughout Zululand and to other likely centres. Fortunately, the threatened invasion, heralded by a southward flight of redwing locusts in the early spring, came to nothing, and eggs were only laid over a limited area in the Lower Illovo district, the resulting hoppers being speedily destroyed.

The previous season a great deal of the work was accomplished with prepared poison and our arrangements for this year anticipated the general use of this. This poison was prepared according to Lounsbury's suggestions and was greatly appreciated, especially by our most experienced officers, who found its use more economic and possessing many advantages over the older methods.

Coincident with the abatement of the Red wing locust the Brown locust of the other Colonies has also practically disappeared. It is hardly credible that these two very different insects are influenced by the same natural conditions; and, although for years past both have been at their worst, there have been periods when Brown locusts ravaged the high veld of the Free State and the Transvaal, whilst Natal enjoyed complete immunity from the incursion of any locusts.

It has always been anticipated that history would in time repeat itself and the Redwing locust would disappear from Natal in obedience to some natural cause. To-day this is generally thought to be the case without any natural phenomenon to account for it.

There has, of course, been an ascendancy of natural agents, for in 1906 the fliers were decimated by disease throughout parts of Zululand, and egg-parasites have been more abundant of recent years, but neither of these agents, nor the more recent assistance rendered by the white stork, have been sufficient to explain the situation of to-day. Indeed, there is every reason for assuming that the benign conditions now prevailing as regards the Brown locust are entirely due to the systematic operations against them, and it is far more reasonable to assume that our own present happy circumstances are due to similar and long-continued efforts coming to fruition as soon as effective hopper destruction was carried on to the north of our sphere of operations.

Granting that the destruction work is to be credited with its full effect, at least it can be said that the finishing touches have been applied by natural agencies. It is my opinion to-day that the campaigns con-

ducted have so lessened the locusts that they have been at last overcome by their natural enemies, the chief factor happening to be the "White Stork."

Where the Redwing locusts are at present it is not just now possible to say, but it is inadvisable to assume that the insects have been exterminated and unwise to relax our vigilance in watching for indications of fresh invasions. Indeed, the work of locust destruction should now be done even farther afield, and should either species assume menacing proportions to the north of South Africa there would be every justification for our taking steps for their destruction, because as certain as they increase there so certainly will they swoop down upon our territory.

WATTLE INSECTS AND WATTLE TROUBLES.

The wattle-growing industry of Natal has been a remarkable development from its inception, and every year sees more and more of our virgin acres broken to sustain this wealth-producing tree. In 1898 wattle culture had assumed no mean proportions, there being some 9,515 acres in existence, and ten years later (1908) the area was returned at 108,444, the land, buildings and machinery alone representing £260,630, and still the rate of extension shows no signs of diminution.

With the exception of the Australian Bug—a pest that does not count because of the general distribution of its natural enemy—the *Vedalia* beetle—the wattle enjoys complete immunity from the one hundred and one insect and fungus parasites of which it is the natural host in its native land.

The attacks of white ants upon plantations have further been controlled quite effectively wherever the suggestion thrown out by this office has been adopted; that is, the destruction of all termite nests in the virgin lands before they have been ploughed by pumping in arsenic and sulphur fumes.

From the inception of wattle culture some of the insects which exist upon the native mimosas took to the cultivated plant, chief among these being the bag-worm and several defoliating caterpillars and beetles. Since then several other insects have acquired a liking for the plants, and the attack of a small capsid bug, a trouble coming more into prominence of late, bids fair to prove one of the most important of all.

It is only natural that the greater development of the industry should lead to some unusual increase in the native insects of the mimosas, and there is no doubt that the near future will call for an extended investigation into these subjects. Diseases other than insect attacks have not come into any particular prominence, but disturbances of a physiological nature have several times come under notice.

MEALIE TOP GRUB.

In view of the divergent opinions held with regard to the life-cycle

and development of the mealie top grub, some further field observations were carried out in the spring. There were all confirmatory of those previously made, and it may be interesting to state that pieces of stalk and stumps collected from newly ploughed lands at Thornybush as late as the 23rd of November contained over-winter caterpillars. These were, of course, exceptionally late, and at the time they were taken pupæ were also found and adult moths were already upon the wing.

The true and economic plan of dealing with this pest is by clearing off all stumps and stalks before the insects have transformed, and as this can be done as late as the last week in August the excuse formerly urged that the stalks were required for winter food no longer carries weight.

In addition to this measure comes the planting as early as possible of a small area of mealies, even if such entails irrigation, to act as a trap crop.

The control of the grub in the field, when taken in time, can be effectively done by pouring poison into the "cups" of the plants, and arsenate of lead has proved the safest form in which to apply this. At the same time such a treatment can scarcely be called an economic one, and at the best only one that can be carried out upon a small scale.

The damage done in a field of mealies by the top grub is due to the fact that at a certain stage of growth the caterpillars wander afield and bore into the stems of sound plants and destroy the core in which at that stage the future tassel and cob are already formed.

The moth does not lay an egg upon each plant, but as a rule deposits a fairly large brood upon individual plants. The young feed upon these plants and riddle them, subsequently wandering off and attacking the field wholesale. It is, therefore, readily realised that originally only a percentage of plants are infested, and consequently a great deal of damage can be lessened by cutting out the plants upon which the young grubs abound. In this stage the grubs are a quarter to half-an-inch in length and of a black colour and quite easily discovered.

A proposal which was seriously put forward some time ago, and which I understand has been adopted with some success by several farmers, is to mow off the mealies right through the field when the first indications of grub attack are noticed. Of course this could only be done whilst the core of the plant is still at a low elevation, because it would ruin the plants to cut below the growing point of the core, which in the very early stage contains in embryo form the future leaves, stem, cobs and tassel. Done at any time, this cutting back checks the growth of the plant, sometimes quite considerably, and the treatment is not one that should be adopted without some consideration and experiment.

MEALIE WEEVIL.

Whilst tanking and carbon bisulphide treatment for the control of

weevil attack are both being adopted, weevil attack remains a very serious consideration for the farmer, the buyer and the shipper.

By recent tests of a varied nature it has been clearly demonstrated that moisture is particularly essential to the life and activity of weevils, and it is this fact which explains the immunity of kiln-dried mealies and the comparative immunity of cob-mealies which are hung up to dry or stored in open and thoroughly well ventilated bins. I mention this as indicating that in connection with weevil attack alone, thorough drying is of first importance to the farmer, and much greater attention should be given thereto.

Speaking broadly, all mealies when harvested may be regarded as weevil infested, because primary infestation usually takes place in the fields. The first attack is slight—a very small affair—but it depends upon just how the grain is treated after harvesting whether it develops into a gross infestation or not.

Because of the weevil test to which grain for export is submitted—the mere presence of a few live weevils condemns a shipment—it is, to my mind, very much a matter of luck whether a consignment gets away.

For instance, "A" forwards 500 bags, they arrive with but little delay on rail, are examined, passed, and expeditiously shipped. He sends a similar quantity a day or so later and when they arrive at the Point they are immediately examined and passed, but a week elapses before they can be shipped; the second examination reveals the presence of weevils, and they are condemned. Strictly speaking, they are no more weevil-infested than the first consignment.

It is the general experience of marine surveyors in England that no cargo ever arrives that is absolutely free from weevil, and so under such circumstances it is obvious that some account might reasonably be taken of the degree of infestation exhibited by a consignment when examined this side.

If at no other time, some justification exists for certain relaxation of the test from September to January for the very simple reason that light infestations are not apt to develop dangerously, because as soon as the steamer gets north of the Equator its entrance into cold waters brings the activity of the insect to a standstill, and the weevils are killed by the cold prevailing when the grain is landed.

Considering the vast amount of grain which has been condemned in the past on account of light weevil infestation, it becomes almost imperative to evolve some scheme, such as the Clayton gas process, which should meet the case if it does what is claimed of it, for treating mealies before shipment and possibly in the ship's holds. More especially will this be the case if ever bulk shipment is adopted, because there can be no doubt that owing to the mealies being shipped as at present in bags,

a certain amount of ventilation is provided which permits of evaporation, rendering the grain less liable to gross infestation.

POTATO IMPORTS.

Considerably greater attention has been given to the inspection of imported potatoes during the past twelve months than ever in the past.

The recognition by the Transvaal authorities of several potato troubles as being particularly pestivorous and the economic importance of two hitherto little known disease has brought this about.

Under the new arrangement any consignment showing indications of disease is condemned, but in some cases importers are allowed to sort over their consignments. Quite the majority of consignments arriving within the last twelve months have been sorted before leaving the port.

Potatoes imported for seed purposes have been found to be affected by a number of diseases, and, although such inspections and precautions cannot give any absolute prevention against the introduction of disease by this means, the work does to a great extent safeguard the grower, and it has certainly resulted in keeping out of the country a number of consignments of very badly diseased seed.

Although at first importers and senders contended that it was impossible to ship sound potatoes and that such diseases as the seed might contain were of no particular moment, I have no hesitation in contradicting both arguments.

FRUIT FLY.

The control of the Fruit Fly now appears within reasonable distance, in view of the success attending the application of Mally's bait. Trials which have been made in several citrus orchards have been attended with remarkable effects, and where the treatment has been applied for the melon fly, which attacks squashes, marrows, pumpkins and the like, it has proved equally successful.

REPORTS AND PUBLICATIONS.

The last regular annual report of this office was for the year ending 30th June, 1906. Very soon after this period the Chief Locust Officer was retired, and I lost the services of the Technical Assistant. The whole of the 1906-7 locust campaign had to be undertaken by myself with the sole assistance of Mr. Kelly. The work involved a great amount of time, and at the close of the campaign a special effort was made to adjust the stock lists and accounts of previous years, which were in great confusion. At the close of this work Mr. Kelly was seconded to the Orange River Colony Service, and under instructions a short course of lectures were given at Cedara. Disorganisation soon followed with the calling out of the Militia late in 1907, and upon the return of my assistant it was only possible to carry through and wind up the 1907-8 locust campaign in time to undertake the 1908 departmental export of

citrus. From then until quite recently that work—extending over 1909—has fully occupied the attention of myself and my small staff.

As is only natural under the circumstances, reports and publications have not had special consideration. A special report was published upon the 1908 citrus export, and the following tabulated statement shows the contributions made to the *Agricultural Journal* since 30th June, 1906. Incidentally it may be mentioned that both the first and second Annual Reports of the South African Central Locust Bureau were prepared and edited for publication in the interim.

Title.	Nature.	Month.	Pages.	Author.
1906				
Insect Collections	Article	July	676-8	H. Berensberg.
Earthworms, etc., i	"	"	692-6	C. Fuller.
White Ant Exterminator	Note	"	709-10	"
Earthworms, etc., ii	Article	August	749-52	"
White Ant Exterminator	Note	"	756	"
The Bagworm Mystery	Article	September	837	"
Pear Blight	Open letter	December	1,135-7	Albert Kelly.
1907				
Insects in German E. Africa	Article	January	59-55	H. Berensberg.
Tomato Troubles	Open letter	March	239-44	Albert Kelly.
House Ants	"	April	331-4	"
Notes of the Month	Misc. notes	"	388-93	C. Fuller.
Chats about Insects	"	May	500-4	"
Notes of the Month	Misc. notes	"	533-5	"
" " "	"	June	641-6	"
Insects as Food	Article	July	757-62	H. Berensberg.
Notes of the Month	Misc. notes	"	765-70	C. Fuller.
" " "	"	August	925-8	"
Scale Insects	Article	September	1,031-55	"
Notes of the Month	Misc. notes	"	1,121-5	"
" " "	"	October	1,261-5	"
" " "	"	November	1,387-93	"
" " "	"	December	1,553	"
1908				
Notes of the Month	Misc. notes	January	65-5	C. Fuller.
" " "	"	February	191-6	"
Ticks and E. C. Fever	Note	April	427-8	"
Locust Destruction	Report	July	865-74	Albert Kelly.
Notes of the Month	Misc. notes	September	1,161-6	A. K., C. F.
" " "	"	October	1,304-10	C. Fuller.
1909				
Notes of the Month	Misc. notes	January	76-90	C. Fuller.
Bagworms	Article	February	185-95	"
Notes of the Month	Misc. notes	"	217-24	"
" " "	"	March	340-5	"
Pineapple Export	Report	"	354-64	"
Potato Troubles	Article	April	427-35	Albert Kelly.
Notes of the Month	Misc. notes	"	493-8	C. Fuller.
Note on Fleas	Note	May	567-9	Albert Kelly.
Notes of the Month	Misc. notes	"	646-53	C. Fuller.
Locust Destruction	Report	June	747-9	Albert Kelly.
Gordius Worm	Article	"	755-6	"
Wattle Caterpillar	"	December	—	W. E. Jones.
1910				
Notes of the Month	Misc. notes	February	173-5	C. Fuller.
The Methley Plum	Article	March	279-82	"
Some Wattle Insects	"	April	394-412	"
Orchard Notes	"	"	407-13	"
The Horn Apple	Note	"	413	"

PLANT IMPORT INSPECTIONS.

The subjoined table gives the various plant imports arriving at Durban during the past three financial years which have been examined or passed by the Inspector of Plant Imports:—

PORT INSPECTIONS.

	1907-8	1908-9	1909-10	
Potatoes	11,663	39,407	39,192	Cases.
Onions	7,297	—	—	"
Apples	10,429	4,957	3,034	"
Pears	677	1,248	8,985	"
Quinces	31	—	—	"
Oranges	757	607	241	"
Lemons	2,754	1,432	926	"
Plums	415	3,675	3,385	"
Peaches and Nectarines	624	2,383	1,829	"
Apricots	193	1,128	1,225	"
Grapes	13,454	14,790	10,880	"
Mangoes	138	107	1	"
Ramie Roots	—	1	79	"
Rubber Plants	103	100	55	"
Ornamental Plants	387	116	125	"
Bulbs	111	86	79	"
Fruit Trees	25	14	29	Consignments.

CORRESPONDENCE.

The correspondence of this office has largely fallen off, chiefly owing, I believe, to the fact that so much time was given up to fruit export, and, of course, to the decrease of office work incidental to the disappearance of locusts.

The following return shows the distribution of correspondence from January, 1907, to May, 1910:—

Communications.	1907 Jan.-June	1907 July-Dec	1908 Jan.-June	1908 July-Dec	1909 Jan.-June	1909 July-Dec	1910 Jan.-May
In	2,409	1,995	1,714	1,338	1,168	787	793
Out	3,509	2,229	1,959	1,748	1,709	1,163	850

CLAUDE FULLER,

Chief, Division of Entomology and Horticulture.

No one ever misses it by giving his horses plenty of clean bedding. Three wisps of straw and a clean horse in the morning do not go together.

The Living Bee.

By MARY RITCHIE,

President, Natal Bee-Keepers' Association; Natal Expert, South African Bee-Keepers' Association.

(Continued from Page 581, Vol. XIV.)

XXV.—WINTER WEATHER.

AUTUMN sunshine and autumn flowers warn us of the approach of winter. Not that there will be any real winter, any need for us to worry about the fashion of our furs, or the sharpening of our skates, but between the dispersal of the seed in autumn and its sprouting in the spring there is a time of rest of winter sleep alike for plants and bees. During May, June and July we do not expect the bees to build combs and gather surplus. As the days shorten, the work of the hive slows down. The bees are later in the morning, earlier in at night. Closer and closer draws the cluster against the cold.

Let in the Sunlight.—There is the much disputed question of shade. I believe strongly in summer shade, but if hives are in thick natural shade in the winter it is well to cut the lower branches and let in as much as possible of the winter sunshine. So much for external conditions, the great secret of successful wintering is natural warmth—plenty bees and abundant stores. Here the bee-keeper must take time by the forelock, if he would have honey in the spring. Leaf-buds and bulbs are formed in the autumn, lie dormant during the winter and wake up in the spring. In the same way colonies should be built up in the autumn so that they will hibernate safely during the dry season and wake up or be “shooked up” in the spring.

On the coast this winter sleep does not occur to the same extent. The bees fly more, consequently there is more wear and tear and even more need of abundant stores.

How envious bee-keepers in colder countries must be of the conditions in Natal. No anxiety about sufficiency of stores; no shutting down of hives and putting them in the cellar; no fighting against damp and snow. What must be guarded against are cold winds, ants, moths, and robber bees.

Cold Winds.—Anyone who has lived in a draughty house in a windy town will sympathise with the bees in their desire to have everything weather-proof. Very carefully and laboriously they seal up the sides and

covers of their hives with propolis to retain the bee heat. We must assist them by contracting the entrances and making sure that roofs are wind and water tight. The ventilation they will attend to themselves upon principles quite scientific. It is doubtful wisdom to open a hive when the outside temperature is much below that of the bees, but learners do many things that are far from wise, and I shall never forget my astonishment when once upon a time I put my hand into the centre of a hive and felt the intense heat of the cluster. (In comb-building it varies from 90 to 100 degrees. As soon as we feel the need of a warmer coat we may begin to think of warmer quilts for the bees. In some districts these would have to be put on at sundown and removed in the morning to keep up with fluctuations in temperature? It is to ensure a warm, even temperature that in cold countries bees are put in the cellar, but sometimes hives are protected on their summer stands by turning a box, lined with old carpets, sacks, etc., over the hive. This would have to be quite tight fitting if used on the Coast, otherwise it would be an excellent place to harbour spiders, cockroaches, and crickets. For most place in Natal warm quilts within the cover are sufficient. If an empty super is used quilts of any thickness can be put on, while a thin board the exact size of the hive is best for the mist belts.

Ants.—Only one who has kept house in a tropical country knows how troublesome these tiny insects can be. They appear from nowhere and are everywhere. Hot syrup in the hive proves just as attractive as potted meat in the pantry. They come and go at first, but if allowed they will soon take up their abode within the quilts and share both food and warmth. Nothing worries bees more than these tiny ants. The black ants they all seize forcibly and fly away with, dropping them at a short distance from the hive, but against the small ants they are powerless. If quite overrun their plight is pitiful. They seem to feel their helplessness and either given in, crying piteously or stand over them trembling with rage, vibrating their wings and “furling” with the fury of an angry kitten, until at last, driven to despair, they desert their hive, take to their wings and fly away.

To be secure from ants, all hives should be on stands at least four inches above the ground, with the feet in shallow enamelled tins or saucers. An inexpensive device is four coach bolts simply screwed into the four corners of the frame of the bottom board, which serve as legs. To set the hive legs in tins and allow the grass or weeds to grow close up all round the stands is the only preventative. Cement stands, now being tried in America, are useless for this country just on account of the ants. I tried them some years ago. The way the ants lined up, quick march across the parade ground, otherwise the alighting board, and into the hive was appalling!

XXVI.—ROBBER BEES.

Thyme and sage, *duranta* and *poinsettia* bloom in the Maritzburg gardens, but on the top of Zwaartkop Mountain the great red aloes glow in the sunshine. Very few people know, for the hill is steep and only resolute climbers reach the top, but the bees know and in the stillness they hum joyously over the flowers and wait impatiently for the buds to open. How did they know? The wind has carried the scent to their rocky homes in the cliff and they need no second invitation to an aloes feast. We must remember this wonderfully keen sense of smell which they possess, if we are to understand the ways and deal with the naughtiness of robber bees.

"Birds in their little nests agree" we sang believingly till one day we saw two sparrows quarrelling about a straw. In the same way after seeing a hand to hand struggle between two workers or witnessing a pitched battle between two hives, we are disillusioned about the meekness of the busy little bee. Their warfare is characterised by the same whole-hearted energy and absorbing intentness they show in their work, and once roused they fight like fiends. They do not use their stings, however, against each other, but bite and wrestle and try to tear one another to pieces.

In autumn when stores are low and honey scarce and "first done helps their neighbours" as the children say, we must be on the look out for robber bees. Prevention is twenty times better than cure, and the bee-keeper must be careful to give them no cause for conflict.

In the first place all hives should be some distance apart so that when opened the scent of their stores does not attract neighbouring bees. If a hive is to be opened for any length of time cover the exposed frames with a clean wet quilt to keep in the scent of the honey. In removing honey from a hive it is always well to cover it with a clean wet cloth for the same reason. Extracting frames should always be returned at sunset, as again the strong scent of the honey from the wet frames, is very apt to excite the bees and start robbing. Scraps of honeycomb should never be left about on any account, but should this happen and the bees find the feast, let it remain till they have finished and all gone back to their hives, otherwise if removed they will hunt round for it or any other stores that they can get.

In the "A.B.C. of Beekeeping," Mr. Root gives a full length portrait of a robber bee and describes its manner of entering and leaving the hive, how slowly and slyly it obtains an entrance and how it comes away wiping its mouth and a wee bit unsteady on its legs, staggering in fact beneath the weight of its ill-gotten gains. A beginner will very soon recognise them by their gait. When hive fights hive there is no mistak-

ing the sounds of the conflict. Sometimes at mid-summer the bees are short tempered and quarrelsome on account of the heat, but at any other time of the year a hand to hand struggle between two bees generally means that robbing has begun and the bee-keeper must come to the assistance of the weaker colony. To close the hive that is being attacked in a hot climate like ours might suffocate the bees; the best plan is that in the "British Bee-Keepers Guide Book" on page 156. Mr. Cowan says, "When robbing has commenced, place a piece of window glass (a camera plate made transparent by soaking in washing soda does nicely) in front of the door of the hive that is being robbed, the top resting against the hive, and the lower end about 1½ inches from the entrance, on the alighting board, to allow the bees to go in and out at the sides. The robber bees going straight at the entrance are stopped by the glass, which can be removed after a few days." An armful of wet grass loosely piled against the hive front answers very well, and if the worst comes to the worst give the hive a fresh coat of paint and watch results!

XXVII.—THE WAX-MOTH.

In tropical countries one of the bee's worst enemies is the caterpillar of the wax-moth, the greatest enemy of all, according to Mr. Root, with the exception of the ignorant bee-keeper! It is a summer pest, but as the grubs live for a long time in a dormant state one must always be on the alert for them, especially in the dry season, when the bees clustering closer tend to leave the outside frames exposed. As a rule the bees are as powerless against these grubs as against the ants, and only those who have seen it with their own eyes can realise the ruin they can bring upon a hive. The wax-moth is of a whitish-grey colour, very shadowy and inconspicuous, a little larger than the moth so destructive to furs. There are several varieties; one is much larger and pure white. The moth, anxious for its young, places them where they will find an abundant food supply, and attracted doubtless by the strong scent of the comb or pollen flies in at the entrance and lays its eggs within the hive. The tiny egg shells burst and little yellow grubs crawl out into a land veritably flowing with milk and honey. On brood and pollen and wax they feast and fatten. The greed of the caterpillars on our cabbages, consuming twice their own weight in twenty-four hours, the devouring hunger of the "voetgangers" themselves, pale before the voracity of these moth grubs! Satisfied at last they weave their silken coverlets and rest, safe within the shelter of their white cocoons their bodies are undone, transformed, rebuilt, wings bud, and finally they, in turn, emerge as perfect moths. But meantime what havoc to our combs, what trouble to our

bees. Powerless against the active grubs they are helpless, fog-bound prisoners now within these silken galleries that fill their hive.

Such a state of affairs is the outcome of neglect, and fortunately is within the power of the bee-keeper to prevent. It is quite easy to tell when a hive is affected. If the frames, when held up to the light, show long lines like silver snail-tracks, the moth is present, for these lines are not on the surface only, but right into the heart of the comb. A hive like this should have constant attention for a time, bottom board carefully cleaned and frames handled frequently. If the hive is discovered to be badly affected the bees should be transferred, the old hive cleaned and painted, inside as well as outside, and the frames treated.

The best treatment I know of is to burn them straight away. Mr. Danzenbaker says frames may be cleansed by shutting them up in tight boxes and smoking thoroughly with a bee-smoker in which some sulphur has been powdered. Another treatment described in the *American Bee Journal* is to fill a small oil-can with gasoline and squirt the cells full wherever there is the least suspicion of a moth grub. The grubs are killed, the combs uninjured, and the bees make no objection to the combs when returned. (The paragraph closes with a warning that gasoline is inflammable and should not be used anywhere near a fire.)

I once bought a neglected hive, when I knew little about bees and less about bee-moths, and instead of transferring the bees to a clean hive and burning the combs as I would do now, I renewed the frames one by one. The bees worked with all their might, had regular spring cleanings, cleaning out the debris of crumbled down comb, but all in vain. I struggled and struggled, cleaned and cleaned, and had almost given up in despair, when one fine day the bees woke up to the cause of all the mischief, and to my delight I found them expelling the grubs from the hive, consequently I never had any further trouble with that colony.

Prevention with regard to the wax-moth, as with many other things, is a thousand times better than cure. This means: (1) Absolute cleanliness inside and around the hives, no pieces of comb left lying about to breed the moth, and all surplus wax stored with naphthaline in an air-tight box. (2) Regular attention and constant watching to see that all frames are covered with bees, and the destruction of very old combs, as the queen always prefers the newest, cleanest combs in which to lay. (3) For winter as for summer all colonies to be kept as strong in bees as possible, for strong colonies will best withstand cold winds, a full hive ensuring warmth; ants, weak colonies always suffer most from ants; robber bees, which are wary of entering a colony which has once successfully expelled them; and, lastly, the wax-moth, for strong colonies will have all frames covered with bees and a strong force of sentries posted at the entrance.

XXVIII.—GOLDEN GAINS.

In concluding these seasonal notes I must pay off a long standing debt to my bees. I have sung their praises as workers, builders, and skilled craftsmen. I have told of their work in gathering honey, and collecting pollen, and of their wonderful honey-harvests. But there is another product of which I have not yet written. I begin to be doubtful if honey is the main product after all. In fact, I am inclined to place honey as a by-product and express the main product in the one word *Happiness*.

A modern writer says with regard to human friendship "it is all a question of addition and subtraction, we add the good qualities subtract the bad, and keep what is left." It is the same in the case of the bees—we add the pleasures and the profit, subtract the disappointments and the toil and take the result—a result which is infinitely more than so many bottles of honey, dozens of sections or pounds of bees wax.

Natal Tree Planting Competitions.

SOME INTERESTING CORRESPONDENCE.

WE have received the following letter and enclosures from Mr. Duncan M. Eadie, the Secretary of the Natal Agricultural Union (Box 512, Durban):—

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

Sir,—I have pleasure in forwarding for favour of publication correspondence in relation to the first tree-planting competition inaugurated in Natal in 1903. Mr. Maurice Evans in that year, through the Agricultural Union, offered prizes of £50 (divided into three prizes of £30, £15, and £5) for each electoral division except Alfred, Alexandra, Eshowe, and Melmoth, which were offered prizes of £25 (divided into three prizes of £25, £7 10s., and £2 10s.) for all planted areas of 10 acres, the minimum extent of any plantation counting towards the area to be 5 acres. There was only one entrant for the competition, Mr. A. Selanders, of Kelvin, Glen Isla. Planting was to take place between January and December, 1905, and judging was to occur before the annual meeting of the Agricultural Union in 1910.

This competition has now ended, and I forward the correspondence because the committee of the Union believes it will interest and assist many prospective tree-planters.

Last year another and more successful endeavour was made to establish a tree-planting competition, and the results of the attempt have been so promising that Government has assigned a sum of £1,000 as prizes for this and following competitions. In all eighteen persons representing 31 five-acre plots have entered the competition, which commenced at the end of March. Judging for this takes place in 1915. The committee regard this entry as excellent. Arrangements have been now made for the 1911 competition. The conditions are practically similar to those of last competition. Entries will close on April 1st, 1911.

To anyone thinking of entering the competition, I will be glad to give all available information.—Yours, etc.,

DUNCAN M. EADIE,

Secretary.

I.

Letter from Mr. Maurice Evans to President, Natal Agricultural Union.

Dear Sir,—In the year 1903 I offered through the Natal Agricultural Union a number of prizes for tree-planting. Natal was divided into 13 districts, and to each district three prizes were offered, a 1st of £30, a 2nd of £15, and a 3rd of £5.

The trees were to be planted in 1904-5 and judged during the present year 1910. The only entry received was one from Mr. A. Sclanders, of Glen Isla, Weenen County. It seemed to me desirable that I should see his trees, and afterwards, if I thought it necessary, appoint through your Union a judge or judges to examine them. The result of my visit was quite satisfactory. I feel that Mr. Sclanders was fully entitled to a first prize, and I have consequently sent him a cheque for thirty pounds. I was very pleased indeed with what I saw at Kelvin. Mr. Sclanders has put in good work which ought to be of value beyond his district. He had to fight difficulties but persisted and has some good plantations now practically secure against further disaster. He has as far as possible kept the different species distinct, a most important point, and I noted their growth, hardihood, and value as timber. All this is what I hoped for when I offered the prizes, one of the objects being that in different parts of Natal men would be planting experimental plantations and the results would be available to those who might follow them in this work of afforestation.

I therefore asked Mr. Sclanders for a report, and he has sent me the accompanying statement, which should have considerable value for those who intend planting in any part of the Colony having similar natural and climatic conditions. My offer did not call forth much response—the economic and other conditions of Natal were abnormal in 1903.

Your Union has again, I understand, offered inducements, and many entries have been received. This I am extremely glad to note as, in my opinion, no more important work can be undertaken in Natal than the judicious afforestation of our land.

Might I suggest that it is a condition that those who win prizes shall furnish reports of their experience, failures as well as successes, for the benefit of their fellow Colonists, as has been done by Mr. Sclanders. —Yours, etc.,

MAURICE EVANS.

Hill Crest, Berea,
Durban.

II

*Letter from Mr. Andrew Sclanders to Mr. Maurice Evans.
(Enclosure to foregoing.)*

Dear Sir,—In view of the handsome prizes you so munificently offered for the best plantations of trees in the different counties of the Colony, I planted for best plantation in Weenen County 31/680/4,840 acres in 1904, and 73/1,130/4,840 acres in 1905, with what I thought best kinds of timber trees.

Concerning the different kinds I planted, their growth, and the conditions of soil and climate, I beg to report as follows:—

The trees were planted during January, February and March of 1904 and 1905. The altitude is about 4,000 feet, and the soil the deep, red soil so common in most parts of Natal formed by the decomposition of whinstone. This soil is too poor to grow crops without manure, but as the soil is deep and porous trees of all kinds grow remarkably well. The following is a list of the trees I planted and my experience of their growth, etc.:—

Amygdalina is the hardiest, the quickest growing, and the largest, of all gums. It stands frost well. The leaves contain a larger percentage of eucalyptus oil than any other tree. The wood is tough, straight grained, suitable for wagon builders, etc. This is a kind which can be planted where the situation is cold and bleak and a break wind is required.

E. siderophloia (the broad-leaved iron bark) is rather tender to frost and should be planted in the best sheltered spots. It is much slower growing than *amygdalina*, but it is a fine timber tree, growing with a beautiful straight stem with very few lower branches. The timber is very strong and durable and is suitable for disselbooms and other parts of wagons, beams and rafters in buildings and for any purpose where strength and durability are required. This is one of the best timber

trees grown. It is considered one of the strongest and most durable timbers of New South Wales.

E. paniculata (grey iron bark).—This kind is also susceptible to frost and should be planted in the most sheltered spots, but is not quite so tender as *siderophloia*. Like *siderophloia* it is comparatively slow growing and is a fine timber tree, growing with beautiful straight stem with few lower branches. It furnishes a hard, durable wood, suitable for sleepers, wagon building, beams and rafters, etc., and for any purpose where strength and durability are required.

E. crebra (narrow leaved iron bark).—This is another valuable timber tree; comparatively slow growing and a little tender to frost, but has a beautiful straight stem with a few lower branches. The timber is strong and durable and suitable for sleepers, wagon work and beams in building, etc.

E. sideroxylon (red iron bark).—This is the most hardy of all the iron barks, grows with a fine straight stem and few lower branches. This and the three aforementioned iron barks (*E. siderophloia*, *E. paniculata*, and *E. crebra*) are considered the best of New South Wales hardwood, and, in fact, are not excelled in any part of Australia for combined strength and durability. Col. Wales, who is an authority on eucalyptus trees, considers *E. sideroxylon* one of the most valuable timbers to grow. Its timber, which is red, is of the highest quality and durability, and is well known in Natal.

E. leucorxylon is a fine hardy tree, easily grown, and has a nice straight stem with few lower branches. The timber, which is hard and durable, is suitable for railway sleepers, wagon and mining work.

E. tereticornis.—This tree is a very hardy tree, and is considered one of the most valuable trees grown in Victoria. The timber is very heavy, strong and durable.

E. rostrata (red gum).—This is one of the hardiest of all the gums, and seems to thrive all over the Colony and in many parts of the O.R.C. It is fairly quick growing, but is inclined to grow crooked, and on this account should be planted close to induce a straight stem. The timber, which is strong and durable, is suitable for fencing, railway sleepers, wagon work, etc., and, being dark in colour, resembles mahogany, and is adapted for furniture.

E. oblique (Tasmanian stringy bark).—This is a very hardy, quick growing tree with tall, straight stem. The wood splits easily and is suitable for mine props, rafters, etc. Makes inferior fuel but good charcoal.

E. hemiphloia (grey box).—This is a tall tree of fairly quick growth and is hardy and well known in most parts of Natal. In Victoria it is valued for railway sleepers, piles, girders and wagon-builders'

work. Messrs. Merryweather & Sons, wagon-builders in Pietermaritzburg, who have tried the timber, state it is a splendid, useful timber.

Pinus pinaster (cluster pine).—Mr. T. R. Sim considers this the hardiest and easiest tree to grow in Natal. It can be sown broadcast like wattles and will thrive where a wattle will fail. At Cedara and in the Cape Colony large tracts have been planted broadcast with good results. The tree is fairly quick growing, and has valuable timber, which is soft and easily worked and when creosoted becomes durable for sleepers. It is a native of France and Southern Europe and is largely used for the production of turpentine.

Pinus halepensis (the aleppo pine) is slower growing than *P. pinaster* but equally hardy and like it can be planted broadcast. The timber is similar to *P. pinaster* but more knotty.

Pinus louffolia (the cheer pine) is a fine, handsome tree, a native of the Himalyas. It is fairly hardy and grows fairly quick. The timber is soft and suitable for boxes and other purposes where pine wood is used. The tree yields turpentine.

Cupressus sempervirens (the common cypress).—This is a fine hardy tree and grows well all over Natal. It occurs in two very distinct forms, viz., *C. horizontalis* and *C. pyramidalis*. *C. horizontalis* is a spreading tree growing 100 feet high. The timber is fragrant and durable, and in old buildings in Italy is known to have lasted hundreds of years without decay.

Cupressus pendula glauca is a beautiful ornamental tree and grows well nearly all over Natal. It is quicker growing and makes a good break wind. The timber is useful for furniture and carpentry.

C. macrocarpa (Monterey cypress).—A large tree of quick growth and spreading habit. It is a native of California and does well in Natal. One of the best trees to form a breakwind.

Cedrus deodara (the Indian cedar) is a magnificent tree, hardy and of quick growth. It is a native of the Himalyas and grows well nearly all over Natal. It attains a height of 150 to 200 feet and has very useful and durable timber. This tree should be planted very extensively in Natal.

Juniperus virginiana (red cedar).—This is a beautiful tree, very hardy, and does well all over Natal. The timber, which is fragrant and durable, is used for fencing posts, furniture, and in the manufacture of pencils. Mr. T. R. Sim considers this one of the safest trees to plant in Natal. It grows in any kind of soil at any latitude, and even on shallow shales. It is not rapid in growth and not a large tree, but it never fails.

Acer negundo (box elder) is a nice ornamental tree, but rather too slow growing. Should be planted in deep, moist alluvial soil.

Robina psuedacacia (white acacia) is an ornamental tree with white scented flowers. The timber is durable and suitable for posts. It is rather slow growing in the early stages.

Quercus robor (common ash).—This well known tree grows well nearly all over Natal. It thrives best on a deep, alluvial, moist soil. As the tree is of a spreading nature it should be planted close to induce a straight stem.

Auricaria Bidwillii (the bunya-bunya of Queensland) is another beautiful and hardy ornamental plant. It attains a height of 250 feet; the timber is fine grained and durable and makes good furniture.

Auricaria Brasilensis.—This is the hardest and quickest growing of all the auricarias. It is a beautiful tree and stands frost well. In Brazil, its native country, it grows to 180 feet. The timber is used for boards, spars, etc.

Auricaria Cunninghamii (the Moreton Bay pine) is another beautiful *auricaria*, *auricaria*, but very tender to frost, and should be planted in warm, sheltered situations. Grows well on the Coast and midlands. In Queensland it attains a height of 150 feet. The timber is useful for flooring and house carpentry.

Auricaria Cookii is a most beautiful tree, but too tender to grow where the frosts are severe.—I remain, yours, etc.,

ANDREW SCLANDERS.

The pig-keeper who makes the most profit is he who keeps his pigs growing from start to finish.

Disinfect your swine pens with fresh air-slaked lime. You can prevent disease by doing this thoroughly.

A hog likes nothing better than roosting in a patch of artichokes, and when a hog is happy he is growing fat.

In terms of Regulation No. 2 (a), made under Ordinance No. 4, 1853, and published under Proclamation No. 58, 1903, the Crown Forest known as the Gala Forest, having been demarcated, has been declared to be Demarcated Forest within the meaning of the Regulations. Plan of this forest is now lying in the Office of the Director, Division of Agriculture and Forestry, particulars of which are as follows:—Bounded north by Lots FP 232 and FP 275, east by Lot S-99, south by Lot S 89, and west by Location No. 1 in the Magisterial Division of Ixopo.

Maize Judging.

By R. A. MOORE,

*Of the Agricultural Experiment Station, Madison, Wisconsin.**

EDITORIAL NOTE.—For “corn,” in the following article, read “maize,” “corn” being the American name for the grain.

THE judging of corn gives the farmer the best opportunity for a fair estimation of the value of an ear of corn. For many years the score card has been used in judging live stock, butter and cheese, but not until recently has it come into general use as an aid in judging corn and other grains. It is not claimed that scoring grains is a definite science, but it seems to be the best means now known to get a fair valuation of the different cereals. By making a careful study of the different divisions under which corn is judged one soon becomes proficient along that line and is enabled to select good seed corn or judge satisfactorily in corn contests. In money value corn exceeds all other grains combined in the United States, and in Wisconsin it is one of the three leading crops, being exceeded in value only by oats and hay.

JUDGING THE BASIS OF CORN IMPROVEMENT.

Corn may easily be improved by the farmer in two ways: by the selection of the best ears for seed from the best stalks in the field, or by selecting the best ears from the best row in a field, each row of which has been planted with seed from a single ear. The selection of seed is a simple method of corn improvement and can be practised by any farmer. The breeding of corn is more difficult and can be done best by the scientific farmer or the agricultural experiment station.

To improve corn by seed selection or breeding it is necessary to know what kind of ears to choose for seed. To do this carefully a list of the most important points has been prepared, for consideration when selecting the best ears, on a sheet known as a score card. Each ear is examined and compared with the points for a perfect ear, which is considered the standard. The Wisconsin corn card has been prepared for a perfect ear of dent corn of any variety, with reference to Wisconsin conditions.

Before corn can be accurately judged, the one who scores the corn must have an ideal in mind which represents the perfect ear. By examination of good specimens of corn, this ideal can be readily fixed in

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the mind, and in judging other ears, the degree in which they fail to equal the ideal can be readily indicated on the score card. In order to best understand the various points of the score card, they must be studied separately, in the proper order, as presented in the following pages.

A sample of corn for judging or exhibition should consist of ten ears of any variety. This number furnishes an easy basis of calculation on the percentages of various defects.

WISCONSIN OFFICIAL CORN SCORE CARD.

1	Trueness to Type or Breed Characteristics	10
2	Shape of Ear	10
3	Colour : a. Grain	5
	b. Cob	5
4	Market Condition	10
5	Tips	5
6	Butts	5
7	Kernels : a. Uniformity of	10
	b. Shape of	5
8	Length of Ear	10
9	Circumference of Ear	5
10	Space : a. Furrow between rows	5
	b. Space between kernels at cob	5
11	Percentage of Corn	10
	Total	100

1.—TRUENESS TO TYPE OR BREED.

PERFECT SCORE: The corn should conform to the standard for the type and breed in form of kernel, shape of ear, indentation and colour of grain, perfect, 10 points.

DIRECTIONS FOR JUDGING: The first point in judging a sample of corn is to determine its trueness to the type or breed characteristics. There are breeds of corn, like breeds of cattle, which have peculiar colours of forms which distinguish them; as for instance, the Silver King is a white variety and the Golden Glow a yellow variety. It is difficult to distinguish between breeds of the same colour, but this may be learned by experience in handling corn of different breeds. In pure corn of any breed there are certain marks which can be easily recognised.

RULE FOR SCORING: Deduct one-half point for each ear which differs seriously from the type.

2.—SHAPE OF EAR.

PERFECT SCORE: The ideal ear is cylindrical, conforming to the standard for the variety and not crooked or too tapering, perfect, 10 points.

DIRECTIONS FOR JUDGING: It is as difficult to find an ear of corn perfect in shape as it is to find cows, horses and sheep with perfect forms. The shape of ears of the different varieties of corn differ as widely as the shape and form of the different pure breeds of cattle. Each class and variety has a characteristic shape peculiar to itself. For example, Silver King corn has an ear of medium length, large in circum-

ference, while the Golden Glow has an ear considerably shorter and finer in cob and general conformation.

The most desirably shaped ear is cylindrical from butt to tip. Where ears are inclined to taper, it will be noticed that two or four rows, as a rule, are dropped near the middle of the ear. In scoring corn, take into consideration the soil and climatic conditions in which the corn is grown. The shape of a desirable ear for Central Illinois would differ in many respects from the shape most desirable for Wisconsin. The shorter growing season in Wisconsin demands a shallower kernel and a smaller ear to enable the corn to mature in a short season.

RULE FOR SCORING. No set rule can be given as to the exact number of points to be cut on account of defects in shape. In general, cut one point for each poorly shaped ear.

3.—COLOUR OF GRAIN AND COB.

PERFECT SCORE: *The colour of the grain* should be uniform and true to the colour standard for the variety, free from missing or discoloured kernels, perfect, 5 points.

The colour of the cob should be a bright cherry red for yellow corn and pure white for white corn, perfect, 5 points.

DIRECTIONS FOR JUDGING: The colour of the corn varies with the breed. The Silver King corn has a cream colour, while the Boone County White has a pearly white colour. Where these shades predominate they become characteristic of the breeds. Yellow breeds vary slightly in colour from a pale yellow to a deep orange, and can only be known by a thorough acquaintance.

As cobs vary from the standard, a cut should be made by the scorer. A bright cherry red denotes health and vigour in corn and a pale or dark red cob denotes lack of constitution or vitality. The white corn cobs should be a glistening white and not a dead pale colour.

Some farmers prefer to grow corn of certain colours. From tests made by readers of corn, and by experiment stations, it has been found that in general, colour makes no difference as far as feeding value is concerned, and it is merely a matter of taste to the grower as to the colour of corn he desires.

White or yellow corn through careful breeding of one variety and neglect of the other would soon show a marked difference in regard to yield and quality in favour of the variety to which best attention had been given, regardless of colour. Like the breeder of live stock, the corn grower should select that breed of corn which suits his taste best, keeping in mind that the quantity and quality and marketable corn per acre are the essential characteristics sought for.

RULE FOR SCORING: For each mixed kernel a cut of one-tenth point should be made. Kernels missing from the ear are counted as mixed.

Difference in shade or colour, as light or dark red, white or cream colour, must be scored according to variety characteristics. A red cob in white corn, or a white cob in yellow corn, should be cut five points.

4.—MARKET CONDITION.

PERFECT SCORE: Corn should be ripe, sound, free from injuries or disease and bright in colour, perfect, 10 points.

DIRECTION FOR JUDGING: By market condition we mean general excellence and the degree of ripeness or maturity. Corn that shows a tendency to be loose on the cob with wide spaces between the kernels should be scored off severely under market condition. Where market condition is perfect or nearly so the kernels are firm on the cob and the ear gives a resping sound when twisted; the kernels fit closely together upon the cob and in the row.

When corn is scored from the feeder's standpoint it is not cut so severely as from the grower's or seedsman's standpoint. When we consider that a bushel of corn plants about six acres and the importance to be attached to uniformity of stand we see the value of considering the market condition from the grower's standpoint in a critical way.

No one head under which corn is judged is so important to Wisconsin farmers as market condition, and all farmers should be able to judge corn for the perfection of that characteristic. The utmost importance is attached to market condition in carrying on trial tests, as a variety of corn is of little value to a community or division of the State, if it does not properly mature within the growing season.

Corn will gradually become accustomed to its surroundings and will adjust itself to varying conditions of soil and climate. By selecting those ears for seed that show good market condition, even if there be but a few in the entire field, the earliness of the corn can be improved materially.

RULE FOR SCORING: Cut one point for every diseased, chaffy, injured or immature ear.

5.—TIPS AND BUDS.

PERFECT SCORE: *Tips.* The kernels should extend over the tip in regular rows, and be uniform in size and shape, perfect, 5 points.

Butts. The kernels should extend over the butt in regular rows and be well developed and uniform, perfect, 5 points.

DIRECTIONS FOR JUDGING: A perfect tip has a central kernel called the cap, which is completely surrounded with uniform kernels. A perfect tip is rarely found, but those which come nearest to the ideal should be chosen, providing it is not at the expense of other more important factors. The tip kernels are likely to be flinty and of a pop corn shape, which is undesirable in dent corn. If bare tips are noticeable to quite

an extent throughout the field, it may be due to the fact that the silks representing the tip kernels which were formed last were too late to receive the pollen to fertilise them. If ears having defective tips are used for seed, their undesirable characters will soon become permanent. Open tips usually accompany shallow and irregular kernels on the ear which makes the kernels on that part of the ear undesirable for planting, on account of lack of uniformity.

In judging the character of the butt of an ear of corn, the way in which the rows come over towards the shank is important. If the corn comes in too close, the ears may drop off the stalk during the ripening period and not fully mature. All ears which have butts improperly filled should be rejected. Corn breeders in desiring to get a large proportion of corn to the cob, often choose ears with too small an attachment for the shank. The butt and the tip kernels are rejected for planting, because they are more likely to be mixed with other varieties, and, owing to their peculiar round formation, they are not uniform, and interfere in the planting. They also seem weaker in germination and are more tardy in growth than kernels from the middle parts of the ear.

RULE FOR SCORING: The tips and butts that do not meet the standard should be scored off quite severely. Where on an inch of cob is exposed at the tip a cut of one point should be made. Regularity of rows near the tip and the shape and size of the kernel must also be considered. If the kernels on the butt are uniform in size and extend around it in regular order, give a full score. Cut in proportion as the grain is small or compressed.

6.—THE KERNEL.

PERFECT SCORE: *Uniformity.* The kernels should be alike in size, shape and colour, perfect, 10 points.

Shape: Kernels should be of perfect wedge shape, narrower or wider at the point, according to the variety characteristics, perfect, 5 points.

DIRECTIONS FOR JUDGING: Kernels should be uniform in shape, size and colour and true to the type or variety. The crown or big end of the kernel should be such that the edges of the kernels slope from tip to crown. The tip of the kernel, which is the part attached to the cob and contains the germ is rich in protein and oil and of the highest feeding value. For this reason a plump tip usually indicates vitality.

The kernels on the cob may be irregular, being deeper at the butt than at the tip. This makes the kernels non-uniform in size and renders the corn almost wholly unfit for seed. No machine will plant kernels of this type so as to get a uniform stand.

Kernels with weak or shrivelled tips should be discarded, no matter how well the outside of the ear may look. At least 85 per cent. of the oil in the kernel is in the germ, hence corn with well formed germs is

desirable. Tests by the Illinois Experiment Station show that the oil in corn may vary from $2\frac{1}{2}$ to $7\frac{1}{2}$ per cent., and protein from $6\frac{1}{2}$ to 16 per cent. If seed corn contains a large amount of protein and oil the crop grown from this seed will be high in these desirable features.

RULE FOR SCORING: Cut one point for each set of kernels which are not uniform. Cut one-half point for each set of kernels which are shrivelled or poorly formed.

7.—LENGTH AND CIRCUMFERENCE OF EAR.

PERFECT SCORE. *Length:* The ear should be up to the standard for the section where the corn is grown, perfect, 10 points.

Circumference: Should be up to the standard for the section, perfect, 5 points.

DIRECTIONS FOR JUDGING: Standard measurements for corn produced in northern, middle and southern Wisconsin, are as follows: Length, northern section 8 to 9 inches, central $8\frac{1}{4}$ to $9\frac{1}{4}$ inches, southern $8\frac{1}{2}$ to $9\frac{1}{2}$ inches. Long ears are objectionable because they usually have poor butts and tips, shallow kernels and hence a low per cent. of grain to the ear. In general the circumference should be three-fourths the length. The standards for various sections in Wisconsin are: Northern 6 to $6\frac{1}{2}$ inches, central $6\frac{1}{2}$ to 7 inches, southern 7 to $7\frac{1}{2}$ inches.

The chief reason for distinct measurements is to secure uniformity and compactness in ears. In scoring one must not accept ears that are out of the natural proportion, but must be governed by some uniform standard. The time will arrive in Wisconsin, as it has in some of the older corn-breeding States, when each distinct variety of corn will have its respective measurements as to length and circumference.

RULE FOR SCORING: Add the deficiency and excess in inches of all ears not conforming to the standard and for every inch thus obtained cut one point. Likewise add the deficiency and excess in circumference in inches of all ears not like the standard and cut one-half point for every inch thus obtained.

8.—SPACES BETWEEN ROWS AND KERNELS.

PERFECT SCORE: *Furrows between rows,* should be straight with uniform space between kernels at the crown, perfect, 5 points.

Space between kernels: No space should be noticeable at the tips near where they are attached to the cob, perfect, 5 points.

DIRECTIONS FOR JUDGING: Straight rows are the most desirable as they give a uniform appearance to the ear and admit of the kernels being placed in a more exact position. The kernels on ears with spiral rows are irregular as to depth, width, and shape of kernel and consequently are not wanted. From corn-breeding experiments at several experiment stations it has been determined that irregularities are transmitted by the mother ear to the progeny, therefore if one desires to make

the most rapid advancement in breeding to a highly developed type we should select only the ears regular in all characteristics.

The furrow or groove should not descend to any great depth, but merely mark the dividing line between the kernels from butt to tip. Where the furrow is deep, thereby exposing a large portion of the surface of the kernel, it indicates that the corn is badly off in type.

The space between kernels at the cob indicates the maturity to quite an extent, the kernel tip in immature corn is shrivelled, and therefore leaves a space readily detected. In well matured corn no noticeable space will be found, but the kernels will fit tightly together from tip to crown. Abundant space between kernels near the cob is an indication of immaturity, and lack of vitality.

RULE FOR SCORING: Cut one-fourth point for $1/23$ to $1/16$ inch furrows and cut one-half point for $1/16$ inch and above. Cut one-half point for each ear showing space between kernels at the cob.

9.—PERCENTAGE OF GRAIN TO COB.

PERFECT SCORE: The percentage of grain should equal the standard for the variety, perfect, 10 points.

Good, well-matured corn should show a ratio of from 85 to 87 per cent. grain to cob. In other words, if we were to shell 100 pounds of ear corn we would get approximately 85 pounds of kernels and 15 pounds of cobs. The tendency with some corn growers is to look for a small cob, thinking that feature of corn to be the leading desirable characteristic. In many instances the selection of small cobs has been practised to such an extent that the yield of grain has been materially reduced.

One should choose a medium-sized cob that will carry from 16 to 20 rows of kernels of medium depth; if the size of the cob is reduced the ear simply drops its rows by pairs until we have but 10 or 12 rows remaining. If, on the other hand, the cob is too small and the grower has been working for high percentage of grain to cob, the kernels are apt to be of too great depth to mature well in Wisconsin climate. Immature and chaffy corn gives a relative low percentage of grain to cob compared with well-ripened corn.

When judging corn for percentage of grain to cob weigh five ears of the sample and record the total weight. Then shell and weigh the grain and record the weight. Divide the number representing the weight of the shelled grain by the number representing the weight of the ears, and the result will be the percentage of grain to cob.

RULE FOR SCORING: Cut one point for each per cent. short of the standard weight for the variety.

BLANK SCORE CARD FOR PRACTICE JUDGING.

The following blank score cards are added for practice in corn judging. The points should be considered in the order given in the preceding pages. Three samples may be scored on each card. In the blank columns write the number of points given the exhibit of 10 ears after subtracting the number of points cut according to the rules for scoring.

	1	2	3
1 Trueness to Type or Breed Characteristics	10		
2 Shape of Ear	10		
3 Colour: a. Grain	5		
b. Cob	5		
4 Market Condition	10		
5 Tips	5		
6 Butts	5		
7 Kernels: a. Uniformity of	10		
b. Shape of	5		
8 Length of Ear	10		
9 Circumference of Ear	5		
10 Space: a. Furrow between rows	5		
b. Space between kernels at cob	5		
11 Percentage of Corn	10		
Total	100		

Name

Sample No.

Remarks

The Position of East Coast Fever.

OUTBREAKS DURING MAY AND JUNE.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 20th May to 20th June:—

Dundee Division.—Outbreaks on the farms “Fels” (sub-division of “Burnside”) west of main line, “Kelvin Grove No. 2,” west of main line and north of Dundee-Vryheid line, “Renier,” west of main line, “Dumain,” east of main line, “Ruitgefontein,” west of main line, “Balgray,” west of main line and north of Dundee-Vryheid, “Dondola,” west of main line and north of Dundee-Vryheid.

Weenen Division.—Outbreak on the farm “Uitzien,” shown on map as “Albert.”

Alexandra Division.—Outbreak on the farm “Bally Glass.”

Utrecht Division.—Outbreaks on the farms “Moorhoek,” “Vryhila,” “Grootvlei.”

Camperdown Division.—Outbreaks on the farms “Beechwood” (sub-division of “Stuermfontein”), “Glen Islay” (sub-division of “Leeuw Poort”), “Doorn Kleof,” “Letheringham.”

Richmond Division.—Outbreaks on the farms, "Hill Top," "Lily Dell," "Best View," "Hlangollen," "Howard Hill," "Commissie Drift."

Estcourt Division.—Outbreaks on the farms "Willowford" (sub-division of "Welgen's Spruit"), west of the main line, "Hattingsvlakte," west of the main line, "Heavtree," shown on map as "Eden," east of main line, "Sanham" (sub-division of "Wagens' Drift," west of main line).

Alfred Division.—Outbreaks on the farms "Rudolphfontein" (sub-division of "Spitzkop"), "Broadmoor" (sub-division of "Kleinwaterfall").

New Hanover Division.—Outbreaks on the farms "Rudolphfontein" (sub-division of Spitzkop), "Broadmoor" (sub-division of "Kleinwaterfall").

Umvoti Division.—Outbreaks on the farms "Chard," "Schoonzicht," "Angakatate," "Mispa," "Harum" (sub-division of "Welgegund"), "Groot Reit Vlei," "Aangelegen," "Benvie."

Impendhle Division.—Outbreaks on the farms J. Harper, "F. P. 21," "Location," "Commonage," "The Glen."

Ladysmith Division.—Outbreaks on the farms "Burford," west of main line, "Boschberg," west of main line, "Nooitgedacht," west of main line, "Marlborough Downs," west of main line, "Meyer's Rest," west of main line, "Waters Meet," west of main line.

Lion's River Division.—Outbreaks on the farms "Shafton House," east of main line, "Adamshurst," west of main line.

Uxopo Division.—Outbreaks on the farms "Norwood," "Helvetia," "Sunrise," "2 A of 2," "Murchison," "Rockcliffe," piece of land between "The Glade and D. Y.," "Gurtnakalen," "S. 41," "S. 24."

No record is kept of outbreaks in the following Magisterial Divisions:—The whole of the Province of Zululand, the whole of the Victoria County, Vryheid, Ngotshe, Babanango, Paulpietersburg, and Umsinga.

Give the swine abundant pure water aside from their swill. Liquid food like milk and whey does not always fully appease thirst.

A show American jackass should be black, with white markings, 15 h. 2 in. to 16 hands, standard measure, and weigh from 950 to 1,200 lbs.

To preserve health and improve external appearance of horses, nothing excels giving a handful of ground flax seed twice a day in ground feed.

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

THE use of green manures in semiarid regions is as a rule impracticable, as with insufficient moisture vegetable matter decays very slowly. The soil is thus filled with air spaces and loses much more water by evaporation.—C. V. PIPER, *Agrostologist in Charge of Forage Crop Investigations, U.S. Bureau of Plant Industry.*

The American standard of excellence gives the following scale of points for turkeys, by which judges determine the qualifications of exhibition birds: Symmetry 10, weight 30, condition 10, head 5, wattle 5, neck 5, back 7, breast and body 10, wings 8, tail 5, legs 5, total 100.—HERBERT MYRICK (*"Turkeys and How to Grow Them."*).

COOLING IN INCUBATION.

Regular cooling is not a necessary condition to secure good hatches, provided the incubator is ventilated on a correct principle. There must be neither too much ventilation nor too little as the former will chill and kill the germs, and the latter will suffocate them. Far more chicks are killed by too much of this cooling process than by too little.—J. H. SETCLIFFE (*"Artificial Incubation and its Laws"*).

FEEDING POULTRY.

The problem of feeding is one of great importance, and should be carefully considered, for on it depends to a large extent not only the general health of the birds, but also the economy which promotes success. It is a subject, however, which should be studied with a large amount of common sense, for there are no hard and fast rules which can be laid down as applying to every case. The price of feeds and the general environment should be considered in determining the right rations.—G. ARTHUR BELL, *Assistant Animal Husbandman, U.S. Bureau of Animal Industry.*

MEALIE ENSILAGE.

A few years ago it was thought necessary to ensilage corn [maize] in an immature state in order to have it keep. This made a sour silage with a strong pungent odour. The consensus of opinion now favours letting the corn go until the grain is fully matured. In ordinary seasons there is a period, lasting but a few days, in which the corn ears are ripe

and the leaves and stalks are green. This is the ideal time for putting it in the silo. If the corn is allowed to mature beyond this stage, water should be added to the cut material at filling time to prevent "fire fanging" of the silage.—LEYMAN PARRIER, *Scientific Assistant, Farm Management Investigations, U.S. Bureau of Plant Industry.*

THE CARROT UNDER IRRIGATION.

This crop has been found to thrive exceedingly well under irrigation upon light soils. A succession of crops may be grown throughout the whole summer, and by the use of some active artificial fertiliser, the growth is rapid and remarkably clean and healthy. Upon clay soils this and other deep-rooted crops do not thrive very well and more shallow-rooted crops should be chosen. When irrigated, the carrots cultivated in rows upon the flat, the water being lead to the plants in channels made by the hoe in the intervals between the rows. It is very common in garden culture to plant carrots for late crop in rows between other and earlier ones, by which the tender young plants are shaded and protected from the heat.—HENRY STEWART (*"Irrigation for the Farm, Garden and Orchard"*).

VALUE OF THE SIPHON.

When the source of supply of water is situated below the level of the immediately surrounding grounds, and considerable expense would be entailed by excavation to a sufficient depth to allow a fall in the direction of supply, recourse may be had to a siphon. The summit of the siphon must theoretically not exceed 34 feet above the level of the surface of the water from which the supply is to be drawn; practically about 25 feet is the limit. The siphon may be charged by an air-pump attached to the longer leg, the communication with the main being cut off by means of a sluice-valve; or the extremities of both legs may be closed by means of sluice-valves and the apparatus filled with water through a cock at its summit; the cock is then closed and the sluice-valves opened, when flow immediately commences.—ALLEN GREENWELL, A.M.I.C.E., F.G.S., and W. T. CURRY, A.M.I.C.E., F.G.S. (*"Rural Water Supply"*).

DRYING APPLES.

The time necessary for drying fruits depends upon several factors. The more important are:—Type of evaporator; depth to which fruit is spread; method of preparing—whether sliced, quartered, or whole; temperature maintained; conditions of the weather; and, to a certain extent, the construction of the evaporator. The application of these several factors to the point in question readily follows. A good kiln evaporator should dry a floor of slices, other things being equal, in about twelve

hours, ten to fourteen hours being the range of variation. Where the fruit is handled on racks the time required is much shorter, but conditions are quite different from the kilns as the fruit is seldom more than 1 or 2 inches thick on the racks. For slices, five hours is considered a reasonable time, with a range of four to six hours. It is estimated that quarters will require from eighteen to twenty-four hours in the average kiln, while the time for whole apples will range from thirty-six to forty-eight hours.—H. P. GOULD, *Assistant Pomologist, U.S. Bureau of Plant Industry.*

PLANTING KAFIR CORN.

The quantity of Kafir corn seed to plant to the acre varies according to the method of planting, the use to be made of the crop, and the conditions under which it is grown. When grown in rows for the maximum yield of both fodder and grain, 6 or 8 pounds to the acre in $3\frac{1}{2}$ -foot rows are desirable, although this quantity is frequently reduced to 3 or 4 pounds. Thin planting, however, produces coarse stalks which are not readily eaten by stock and a small number of large heads which yield less grain than the many small ones resulting from thicker seeding. When the stalks are a considerable distance apart, the heads frequently do not grow entirely out of the "boot," or sheath, and the inclosed part of the head rots or fails to mature seed. Where the crop is to be harvested by hand, thin planting is desirable. For hay and pasture it should be much thicker—one half to one bushel seed to the acre in rows or drills, and one to two bushels in broadcast seeding.—C. W. WARBURTON, *Asst. Agriculturist, Farm Management Investigations, Bureau of Plant Industry.*

DEPTH FOR PLANTING BEANS.

The depth at which beans should be planted is determined by the character of the soil, and the season of the year at which they are planted. In heavy, retentive soils, planting should be made comparatively shallow, as the peculiar habit of growth of the bean is such that it cannot readily reach the surface if planted deep in such soils. Upon light soils and early in the season planting can be made quite deep. Three inches is not too deep upon such soils, but $1\frac{1}{2}$ or 2 inches is the maximum depth for planting upon retentive soils. The cowpea is possibly more exacting in regard to the depth of planting than the field bean, the stalk of the young cowpea being more slender and less able to force the seed leaves through any crust of earth that may have formed after planting. All things considered, a satisfactory depth for planting beans is about $1\frac{1}{2}$ inches.—L. C. CORBETT, *Horticulturist in Charge of the Arlington Experiment Farm, U.S. Bureau of Animal Industry.*

Correspondence.

** * Correspondence is invited on topics of interest to farmers. Letters should be written on one side of the paper only; and while a nom-de-plume may be used, all letters must be accompanied by the name and address of writer. The Editor is not responsible for the opinions of his correspondents: the letters which appear in these pages are published as the opinions of the respective writers, and their insertion does not necessarily imply editorial concurrence with the views expressed.*

ROOT CROPS AND FERTILISERS.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—I enclose a photograph of a field of young swedes which may be of interest to you, since it gives a clear demonstration of the futility of planting root crops insufficiently manured.

This field was planted with a machine set to the rate of 350 lbs. to the acre, Safco special Root Fertiliser being the fertiliser used.

The photograph gives a fine contrast between the lines fertilised and a line where the machine jammed.—Yours, etc.,

E. M. T. BURGESS.

Lidgerton.

[We reproduce in this issue the interesting photo referred to.—ED.]

NATAL FRUIT EXPORT.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Referring to your article in the March issue of your *Journal* dealing with the report by the Commercial Agent on the export of Natal fruit.

We are the South African agents of Messrs. Garcia Jacobs & Co., one of the firms of fruit auctioneers mentioned by the Commercial Agent in his report. We sent a copy of your *Journal* to Messrs. Garcia Jacobs and Co., and we have just received a note from them to the effect that they were very interested to receive a copy of your *Journal* and Mr. Harrison's report. They also write as follows:—

Mr. Harrison's report is to our mind a fair one, and especially his reference to private sales as compared with public sales. We have never denied that for a small quantity of fruit temporary better results may be obtained by private sales, and if it was intended that the business was to be carried on on a small scale only, we should have no comment to

make. We take it that the object of South Africa is to extend the fruit export in a similar way to what has been done in Canada and Australia, and the only means of accomplishing this development is by selling the fruit by auction. We cannot agree with Mr. Harrison's remarks with regard to the possibility for private salesmen to re-rack the goods in the event of their arriving in bad order. If the fruit is in bad condition no re-packing can alter the waste in the fruit, and although temporarily it may appear to be sound after having been re-packed, experience is that within 24 hours after re-packing, the packages are almost as bad as they originally were. Further, the trade will not, unless under exceptional circumstances, purchase re-packed fruit."

We shall feel much obliged if you can find space in your next issue of your *Journal* to publish the foregoing remarks.—Thanking you in anticipation, we remain, etc.,

KARL SCHWARZ & CALDER,

Agents in South Africa for Messrs. Garcia Jacobs & Co.

P.O. Box 330, Durban.

Warmth is half the feed for cows, and remember that foul air does not keep an animal warm.

A temper under control is an invaluable asset to a man employed in handling cows.

If a cow is given all that she will eat up clean twice a day, this will usually be found sufficient.

Milk from a clean udder, milked with clean hands and quickly cooled, keeps pure and sweet for a long time.

It is exceedingly difficult to make good butter where churning is done only once a week, as the cream gets too old and often too sour before churning.

The farmer who gains a livelihood through his milk cows does not care particularly if the udder is ill-shaped and unsightly, so long as the yield of milk is all right.

A half-starved, neglected young animal cannot make so good a cow as the one which is started right and gets good care and plenty of nourishment throughout the entire period.

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

* * *Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.O. Editor, "Natal Agricultural Journal," Maritzburg.*

Fruit Culture.

SOME CHATS FOR BEGINNERS.—III.

By "POMUS."

WE have seen that fruit trees like other plants reproduce themselves by means of seed. We have now to observe that although the planting of seeds is the surest way of propagating fruit trees in general, nevertheless we can never be quite certain that the same variety of fruit of which we have planted seeds will be reproduced. If we plant a peach stone a peach tree certainly will come up, but if that stone has been taken from fruit that is highly developed and is generally very fine from a market point of view, it does not necessarily follow that because the seed from that fruit has been planted, the fruit on the tree which results from the planting of that pip will be of the same high class quality as the ordinary fruit. This is where the science of fruit culture begins to come in. Having secured, by whatever means, a desirable kind of peach, apple, pear or any other fruit, how are we to propagate that fruit if we find that on planting seed from the fruit a tree springs up which eventually yields fruit not nearly as large and choice and sweet as the original fruit?

It must be realised that the course and progress of evolution, when it is directed by natural cases—in other words when it proceeds undisturbed by man—is very slow indeed; but whilst it is slow it is sure.

Man, on the other hand, studies the methods of evolution and hastens the process by artificial means; but the rapidity of development is obtained at the expense of security, of fixity of type. Man can go on propagating highly evolved varieties of fruit, but the high results which he obtains are only secure to him so long as he continues his striving, continues to apply his scientific methods to the propagation of fruit. We shall see later on how new varieties are obtained by man. In order, after having obtained a desirable type of fruit, to continue in the production of this fruit, he has to resort, in propagating the variety, to certain artificial methods known as budding, grafting, layering and planting cuttings. The adoption of these methods of propagation will enable him to produce as many trees as he likes, bearing fruit of as good quality as the artificial one whose evolution he has forced to a high plane of excellence. We shall now proceed to discuss these various methods of propagating new varieties of fruit trees.

Briefly, we may say at the outset that these methods of propagation have as their underlying principle the multiplication of the branches and roots of the original desirable tree. A cutting is made from the tree whose fruit it is desired to reproduce and is planted in the ground, where it takes root and later springs up into an independent tree bearing fruit of its own; or a branch on a tree is bent down and portion of it covered with earth, which portion takes root and forms the beginning of a new and separate tree; or again a cutting is affixed in a certain way to a tree bearing a common type of fruit, and the cutting grows from the tree and bears fruit of its own, or yet again a bud from a desirable tree is affixed to a branch on a common tree, and it (the bud), like the cutting, shoots forth and bears fruit of the excellent type required.

PROPAGATION BY CUTTINGS.

"Every leaf bud on a fruit tree," it has been said, "may be regarded as an embryo branch, and capable of forming a tree when supplied with separate roots." The difficulty is, however, that a single bud does not contain within itself sufficient plant food to enable it to live until it has thrown out roots; but this difficulty is overcome by cutting with the bud sufficient stalk to supply the plant food required. In order to carry out this method of propagation successfully a complete shoot of one year's growth should be taken, and this is then planted in the soil. This is a method of propagation followed with the grape, which is perhaps the most familiar example: no one ever plants grape seeds except when experiments are being made in the production of new varieties, and at the same time propagation is rarely effected in the case of the grape by means of budding or grafting. If side shoots are chosen they should be cut off close to the main stem of the tree, whilst late spring shoots should be cut off at the point between the one year's and two years' growth.

Cuttings should be taken in the winter, at any rate before the tree springs into active growth. About 2-3rds or $\frac{3}{4}$ ths of the shoot should be buried beneath the surface, and it is as well to shade the planted cuttings until they have taken root and are growing well. If they are long, such as, for instance, those of the grape, they should be planted in a sloping position in order that the lower ends may not be beyond the reach of the influence of the sun's rays. Also take care to press the soil closely against the cuttings.

PROPAGATION BY LAYERS.

Propagation by means of layers is a step in advance of the method of cuttings. I have explained that a bud by itself can not grow if severed from the tree, because it has not in conjunction with it sufficient plant food to keep it alive until it throws out roots. The difficulty, as we have seen, is overcome to some extent by cutting off with the bud a portion of stem which will supply the bud with the required nourishment. It may be, however, that the stem does not answer the purpose sufficiently well, and where this possibility is anticipated the method of layering can be resorted to, which means nothing more in principle than the planting of the shoot in the ground without severing its connection with the tree. In this way the shoot and the buds it bears are able to draw upon the parent plant for nourishment until it has thrown out, from the portion buried in the ground, roots which will extract from the soil the required nourishment. A familiar example of this method of propagation we have in the case of the carnations. I mention this because everyone is familiar with the practice of propagating carnations by layering, and it will serve to illustrate the principle.

If roots are not readily thrown out by the layered shoots they can be assisted by cutting into the portion of the shoot which is to be buried and then running the knife a few inches upwards, so that when the stalk is bent on layering, the cut portion will be separated and assume a perpendicular direction downwards. Roots will then more rapidly form because the backward flow of the sap will be retarded and will find an outlet by throwing out roots. If the branch is stiff it can be held down by means of a forked stick.

Layering is best done when the bark of the shoot proposed to be layered is soft and not too ripe. A little before midsummer is about as good a time as any. The operation should be performed preferably in moist weather.

(To be continued.)

Good, pure water is as essential for the welfare of the horse as good food, and no other essential is so easily provided.

Agricultural Chemistry for Beginners.

CHAPTER IX.

By ARCHIBALD PEARCE.

CALCIUM AND LIME.

LIKE potassium, which was treated of in the last chapter, calcium is a metal very seldom seen in its metallic state, but its compounds are of enormous importance from our point of view. It is one of those substances without which no plant can live, and is sometimes added to the soil in large quantities to improve its tilth or texture, or to correct its sourness. In the form of calcium carbonate, usually called carbonate of lime, it is found in vast quantities in many lands, and is familiar to us under the names of chalk, marble, and limestone. These generally contain a proportion of magnesium carbonate as well, but the less of this there is present the better from an agricultural standpoint. The lime which is present in all fertile soils generally exists in the same form, namely, as carbonate. As is the case with other carbonates, it is easily decomposed by acids, and carbonic acid escapes with effervescence. This fact supplies us with the means of making a test as to the quantity of lime present in any soil. About two ounces of the soil should be moistened with water and an ounce of hydrochloric acid poured upon it. If there is a brisk effervescence we may conclude that we have plenty of lime in the soil; if no escape of gas is noticed, the soil is poor in lime; if the experiment is not quite certain in its result, we may have to call in the aid of an analyst to decide the question as to whether there is enough present to render the land fertile.

Calcium carbonate is quite insoluble in pure water, but it is remarkable that if the water has carbonic acid dissolved in it, a considerable amount of the carbonate will dissolve also. In Chapter VII. an experiment was described, showing how carbonic acid and lime combine to form calcium carbonate. Now, if this experiment is repeated, but instead of stopping when the carbonate has been formed we continue blowing for some time—perhaps ten minutes will be necessary—we shall notice the milky solution begin to get clear again; we may not get it quite clear, but the effect will be unmistakeable. The explanation is that as soon as the carbon di-oxide in the breath has combined with all the lime there is present, the water begins to take up some of the gas, and thus the solution of carbonic acid is formed which has the power

of dissolving lime. This process is of great importance in nature; rain water naturally contains a quantity of carbonic acid, which it obtains from the air; and when it falls upon a limestone rock, or comes in contact with lime in the soil, it dissolves some and carries it along wherever it may run to. For this reason the lime in the soil has always a tendency to work gradually down to the lower levels, or even to be washed out altogether.

QUICKLIME.

If calcium carbonate is heated to a red heat, the carbonic acid is driven off, and the basic oxide of calcium remains, to which the name of quicklime, or simply lime, is given. It has a most remarkable affinity for water, and if a lump is wetted it begins to steam and get very hot, and finally falls down to a fine grey or white powder, called slaked lime; this is a compound of lime and water, and its chemical name is calcium hydrate. If quicklime is exposed to the air, it soon absorbs moisture and becomes slaked, being then said to be air-slaked. Both quicklime and slaked lime also attract carbonic acid from the air, and become converted into carbonate again. In order to preserve quicklime, therefore, it must be kept air-tight; and slaked lime cannot be left exposed without losing its qualities. Lime is powerfully alkaline in its nature, and can neutralise the strongest acids; its solution restores the blue colour to reddened litmus, and has the characteristic alkaline taste.

THE ACTION OF LIME ON SOILS.

If we take a little clean sand and shake it up with water, it will settle to the bottom immediately on being allowed to stand, leaving the water quite clear. If the same experiment is tried with some clay, some of it will settle easily enough, but there will be some very fine particles which will keep the water thick for many hours, since on account of their fine ness they float for a long long time. But if a little lime be now added, these fine particles cling together and form larger masses, which settle down much more easily and quickly. It will be now easy to perceive how lime acts on a clay soil. We know how hard such soils are to manage, how they cake together, especially if trodden on while wet, and this is because the small size of the particles enables the soil to pack closely together into clods. But if well dressed with lime, an effect takes place somewhat similar to that noticed in our experiment above; the larger particles formed do not pack so tightly together, and the soil becomes looser and more easy to till. On the other hand, if the soil is very sandy it is too open and loose, and the effect of lime upon it is to bind the particles together, somewhat in the same way as happens when mortar is made of lime and sand. Of course, we do not desire to make the soil into a hard mass of that kind, but sufficient of the binding effect

is produced to give the soil the necessary firmness. Another benefit which liming gives is to alter the composition of some of the insoluble constituents of the soil, so as to enable them to become active plant-food. For instance potash is often present, especially in clay soils, in such a state of combination that plants cannot feed on it; but the addition of lime causes these compounds to change into others more soluble, so that the insoluble or dormant potash becomes useful at once. Again, lime is a strong alkali, and if applied to a soil which an excessive quantity of decaying vegetable matter or insufficient drainage has rendered acid or sour, it neutralises the organic acids which cause the sourness, and renders the soil sweet and wholesome again. But some caution is required in its application, for it has the power of quickly using up and destroying the vegetable matter in the soil; and we must therefore take care that we do not reduce the quantity of this valuable matter too much. Sandy soils, which depend so much for their fertility on the organic matter they contain, are especially liable to be injured in this way. Accordingly, whenever a soil is limed, it is usual to supply an extra quantity of organic matter as well, either in the shape of kraal or stable manure or by some other method. There is a couplet many generations old, well known in England, which says:

"The use of lime without manure,
Makes both the farm and farmer poor."

And the old saw is full of truth.

METHODS OF APPLYING LIME.

When a field is to be dressed with lime, it is generally applied in the form of quicklime or of slaked lime. If these are carted on to the field and left exposed in heaps for any time, it is plain that they will soon lose their virtue by being converted into carbonate again, and all the trouble and expense of burning will be wasted. The best way, if quicklime is used, is to slake it with only so much water as will enable it to form a dry powder, and not a wet mass; it is then put in heaps on the land and covered with earth until it can be spread. Lime already slaked is covered the same way. As soon as spread it should be harrowed in; harrowing is better than ploughing, for lime tends to work down to the bottom of the soil in course of time, so that it should be left near the surface. Of course, ploughing the land brings it to the top again, but still some gets beyond the reach of the plough every year. If unburned limestone is put on the land, it has not the same effect as the other kinds, either on the texture of the soil or its composition. It does, however, act slowly in both ways, and at the same time supplies the crop with plant-food.

GYPSUM.

The sulphate of calcium, known also as gypsum and sulphate of lime, is a naturally occurring substance often used as a manure in districts where it is plentiful. It is the substance which, when burned at a red heat, produces plaster of paris. As a source of lime for plant-food it is valuable, but has little or no effect on the texture of the soil. It helps to set free dormant potash in the same way as quicklime does, and is very useful to sprinkle on manure-heaps to prevent the loss of ammonia. It is always found in superphosphate and kindred manures, being formed, as described, in the process of their manufacture.

QUESTIONS.

1. What is the chemical name of chalk? In what other forms is the same substance found?
2. What is the effect of heat upon chalk?
3. How is quicklime made, and what is the result of wetting it?
4. Why must quicklime be preserved out of contact with the air?
5. Compare the action of lime upon a clay, a sandy, and a sour vlei soil.
6. Can you get chalk to dissolve in water?
7. Is it ever dangerous to apply lime to a field? If so, how can the danger be avoided?
8. Show that in some cases manuring with lime may be equivalent to manuring with potash.
9. What do you know about gypsum?

A hen suitable to become the mother of the future laying stock should be a good producer herself, and one fed to stimulate production.

The appetite of the hen is some indication as to her productive capacity. Those with good appetites will meet one at the door at feeding time, and, if at all tame, may hop on to the feed basket.

THE FOOD OF PLANTS.—In general, it may be said that an abundant supply of phosphoric acid and potash, especially the former, tends to increase fruitfulness, hardiness, and firmness of leaves and stems, while an abundance of nitrogen has a tendency to produce just the reverse conditions; and while the plant cannot be at its best without a suitable supply of nitrogen, the plants which are grown chiefly for their fruits may be easily injured by an amount only slightly exceeding a sufficiency.

The Principles of Manuring.

IV.—PHOSPHORIC ACID AND POTASH.

HAVING dealt with nitrogen, the next element of plant food which we have to discuss is phosphoric acid. Nitrogen is the most important element of plant food, because most soils are better supplied with manurial elements than of available nitrogen, and furthermore plants do not take up as much phosphoric acid as they do nitrogen. Phosphoric acid, however, stands next to nitrogen in importance. In every soil there is to be found phosphoric to some extent, but it is not always present in an available form in any sufficient quantities. Liberal cultivation of the soil assists in rendering the phosphoric acid available, and the deficiency is also to be made up where necessary by the addition of fertilisers. We will not console ourselves in the present article with the various fertilising materials containing phosphoric acid which are at the disposal of the farmer wishing to enrich his land, as this will be discussed in later articles. For the present it is sufficient to point out the position which phosphoric acid occupies in agriculture in a general way. Phosphoric acid is used by plants for the production of seed, and consequently it is these elements which we have to apply more than any other to mealies and other cereals, if we are desirous of obtaining large crops of *grain*. If, of course we plant cereal crops (that is to say mealies, oats, barley, wheat and oats, and other members of the grass family, for fodder purposes and so desire to obtain good tonnages of leaf and stalk, we must apply nitrogen, phosphoric acid being in such cases essential, in comparatively small quantities. Mineral phosphates such as are found at Weenen and elsewhere in Natal, and bones are among the leading sources of phosphoric acid for the manufacture of commercial fertiliser. Phosphoric acid is also found in guana (which is used also for manure), in plants, in animals (besides in the bones) and farm-yard manure—that is to say the excrement of farm animals; and a large source of supplies is also to be found in what is known as basic slag, which is a rich phosphoric acid by produce obtained in considerable quantity in steel works from the basic process of steel manufacture.

POTASH.

Potash is the third and last element of plant food which it will be necessary for us to discuss. Potash is of far less importance than phosphoric acid from the farmer's point of view since it occurs abundantly in moist soil, and consequently it is not necessary to apply this element in as considerable quantities as is the case with phosphoric acid and nitrogen. Furthermore, when suitable manure is applied to the land there

is not such a loss of potash since the grain which is removed from the farm contains chiefly phosphoric acid. Also, the straw which is fed to the farm animals or which is used as litter in the stables and cow-houses and afterwards applied as manure to the land contains considerable quantities of potash which is returned to the soil.

Potash occurs on a wide scale over the surface of the earth, but extensive deposits have been found which can be exploited commercially and which form a no inconsiderable source of the world's supply of potash. Such deposits occur, for instance, at Stassfurt, in Germany, and the best known of the potash salts found there is that known as kanit. Although potash is present to a considerable extent in most soils it is as a rule to be found in a form not available for use by plants, and this accounts for the marked effect which potash has upon the soil when applied artificially. The ash of plants contains a large percentage of potash, and consequently wood ash is a useful manure so far as this element is concerned. The crops which remove most potash from the soil are the root crops, especially mangels. Cereals remove the least.

(To be continued.)

Tests for Students.

SOME USEFUL QUESTIONS AND ANSWERS.

TILLAGE.

Question 1: What is meant by tillage?

Answer: By tillage is meant the stirring of the soil for the purpose of aiding the growth of plants.

Question 2: What are two different kinds of tillage?

Answer: (a) Tillage which covers the entire ground, (b) tillage which covers only that part of the ground which lies between the plants. We practice the former before the seed is sown to prepare the land for the crop, and the latter between the rows of growing crops, to maintain the condition of the soil.

Question 3: What are other kinds of tillage?

Answer: We speak of surface tillage, shallow tillage, and deep tillage. Surface tillage is the stirring of from 2½ to 8 centimeters of the surface of the soil. Shallow tillage may extend 15 centimeters into the soil, and deep tillage is that which extends below 15 centimeters.

Question 4: What three things does tillage do?

Answer: (a) Tillage improves the physical condition of the soil by refining the soil and extending the feeding area for the roots; by increasing the depth of the soil so that the plants obtain a better root-hold;

by making the conditions of moisture and temperature more uniform throughout the growing season. (b) Tillage aids in the saving of moisture by increasing the water-holding capacity of the soil, and by checking the evaporation by means of the surface-mulch. (c) Tillage hastens the chemical action of the soil by admitting air to the soil, and by hastening the decay of organic matter.

Question 5: What three different classes of tools are used in tilling the soil?

Answer: (a) Deep-working tools, (b) surface-working tools, (c) compacting tools.

Question 6: What are the principal deep-working tools?

Answer: Different kinds of ploughs.

Question 7: What are the principal reasons for ploughing?

Answer: (a) To get the land in condition for planting, (b) to pulverise the soil, (c) to turn under manures, green crops, and trash, (d) to deepen the soil, (e) to break up the hard pan, (f) to warm and dry the land, (g) to allow the weather to act on the soil.

Question 8: How deep should lands be ploughed?

Answer: Under ordinary conditions lands should be ploughed 6 or 7 inches deep.

Question 9: What are the principal surface-working tools?

Answer: Hoes, rakes, cultivators, and harrows.

Question 10: For what purposes do we use surface-working tools?

Answer: (a) To make beds in which seeds can be sown and plants set out. (b) to cover the seeds, (c) to pulverise the soil, (d) to establish and maintain an earth-mulch, (e) to destroy weeds.

Question 11: How frequently should a harrow or cultivator be used?

Answer: The harrow or cultivator should be used as often as the soil becomes hard, particularly after every rain. In dry times surface tillage should usually be repeated every ten days or oftener. The drier the soil the greater the necessity for surface tillage.

Question 12: What are compacting tools?

Answer: Rollers and implements known as "planks" or "floats."

Question 13: What are the reasons for using these tools?

Answer: (a) To crush clods, (b) to smooth the ground for the seed bed, (c) to hasten germination of seeds, (d) to make loose soils more compact and solid, (e) to put the land in such condition that other tools can be used.

Question 14: What is the principal objection to rolling land?

Answer: When land is rolled the surface-mulch is destroyed so that more or less soil moisture is lost by evaporation. On lands that have been rolled, surface tillage should begin as soon as the plants have appeared.

Need of Salt for Sheep.

EVERYTHING that is contained in any animal must come from the food and water consumed; every minute of any animal's life there is a waste of the substance, and consequently whatever is thus wasted must be supplied in the food. Every secretion and excretion from any animal contains salt, and it has been learned by exact method that a sheep excretes from its body every day one drachm of salt.

This is equal to $\frac{1}{2}$ oz. every week, or 26 oz. in a year.

Many farmers do not realise what would happen if this actual necessity of life (salt) were not supplied.

A handful of salt is a small matter, but the life of a score or more of sheep may be sacrificed for the want of it any time during the year. The first result of this want is falling off of the appetite, or the appetite becomes perverted, and all kinds of rubbish will be sought to supply the want. But in either case the result is the same. The food is not duly digested, and the nutriment of it is wasted, and so far as these failures go the animals starve.

The supply of salt is thus one of the most exacting necessities of not only sheep, but other stock as well, and as the domesticated animals are wholly dependent on their owners or keepers for their substance, and if this food—which salt really is—is not duly supplied, the animals must, in fact, starve, not only for the want of salt, but through the failure of the digestive organs to perform their functions for the need of it.—(W. H. UNDERWOOD, in *Agricultural Gazette*.)

Poultry Notes.

Too many chicks spoil the brood.

A chick in the nest is worth two in the mind.

The less the help the stronger the chicks.

The proof of the hatching is the chirp of the chicks.

The chick will never grind with the grit it never gets.

Grit is a virtue in man and fowl

The lazier the hen the smaller the profits.

Silence may be golden, but not in a hen.

In general, eggs cannot be set the day they are laid.

The egg shell is porous, and will, therefore, allow the egg to absorb bad odours. Store the eggs in a clean place, and market them at least once a week; by following this method one should soon be able to get a reputation for furnishing eggs that are good and genuinely fresh.

Meteorological Returns.*Meteorological Observations taken at the Govt. Stations for the Month of May, 1910.*

STATIONS	TEMPERATURE (Fahr. Deg.)				RAINFALL (In Inches)					
	Means for Month		Maximum for Month	Minimum for Month	Total for Month	No of Days	Heaviest rainfall in 1 day.		Total for Year from July 1 1909	Total for same period from July 1 1908
	Maximum	Minimum					Fall	Day		
Observatory	76.1	58.9	85.1	52.0	5.13	7	3.51	26th	49.61	39.39
Stanger	78.6	57.8	88	52	5.60	5	2.65	25th	48.32	40.60
Vernam	79.0	51.7	92	50	3.87	9	1.80	25th	36.70	37.30
Greytown	72.9	42.2	81	31	2.92	4	2.07	21th	31.87	44.83
Newcastle	76.6	58.3	84	20	—	—	—	—	31.24	—
Lidgett	71.3	32.8	82	20	2.82	7	2.45	24th	42.06	43.38
Estcourt	72.2	46.8	80	28	—	—	—	—	29.13	31.99
Umbogintwini	78.1	51.8	85	49	5.40	9	2.50	27th	49.71	—
Mid-Bhovo	73.8	52.9	87	41	6.69	6	2.54	26th	39.76	44.12
Port Shepston	75.9	57.7	84	48	5.10	9	2.90	25th	45.41	40.65
Umzinto	81.3	45.7	89	44	5.16	7	2.17	25th	45.41	45.55
Richmond	70.0	47.2	83	36	5.13	6	2.60	24th	45.89	55.52
Maritzburg	75.7	46.7	86	35	3.58	8	3.04	24th	38.69	37.89
Howick	72.9	40.7	82	30	2.55	3	2.16	25th	33.95	40.59
Lady-smith	79.1	43.2	87	34	5.07	3	3.03	24th	27.11	—
Dundee	71.9	46.9	80	36	2.7	3	1.10	29th	29.16	39.63
Krantzkloof	74.1	56.9	87	48	4.85	7	2.79	27th	43.73	42.78
New Hanover	76.2	46.6	85	34	1.36	5	3.00	21th	46.70	43.06
Krantzkop	78.2	47.0	82	12	3.05	3	1.10	24th	39.26	35.68
Nqutu	79.8	39.0	84	35	3.95	2	1.71	26th	—	37.13
Ulrecht	78.6	40.8	84	30	2.22	1	1.22	15th	26.43	—
Ngom Forest	70.4	50.6	79	45	2.03	11	1.10	6th	69.63	—
Empangeni	79.7	51.5	91	45	3.91	6	1.55	26th	53.96	44.10
Mtunzini	82.1	53.6	87	59	6.75	4	3.50	26th	55.57	72.20
Uthombo	73.4	57.7	84	51	1.95	5	2.90	25th	54.21	42.19
Point	—	—	—	—	5.82	9	1.19	25th	54.01	41.19
Nottingham Road	69.5	31.0	78	17	1.55	4	1.38	24th	30.93	—
Charlestown	69.5	35.5	76	26	1.6	3	1.05	26th	31.79	45.41
Bulwer	—	—	—	—	2.93	5	1.59	21th	47.35	58.58
Isopo	—	—	—	—	1.99	3	2.38	25th	38.15	38.15

Meteorological Observations taken at Private Stations for the Month of May, 1910.

STATIONS	TEMPERATURE (In Fahr. Degs.)		RAINFALL (In Inches)					
	Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day		Total for Year from July 1, 1909	Total for same period from July 1, 1908
					Fall	Day		
P.M.B. Botanical Gardens	85	32	2.81	6	2.41	24th	34.73	38.15
Ottawa	—	—	1.02	7	1.56	16th	37.99	37.44
Mount Edgecombe	—	—	4.87	6	1.80	27th	45.25	—
Umzinto, Beneva	—	—	5.11	5	2.38	25th	41.99	41.55
Riet Vlei	—	—	2.86	3	2.25	24th	24.80	32.90
Cedara—Vlei Station	82	25	2.63	5	1.95	25th	—	—
Winkel Spruit	84	50	5.13	7	1.93	25th	45.91	43.05
Weenen	85	29	1.5	1	1.5	24th	21.61	—
Giant's Castle	65.9	42.04	1.8	3	1.1	24th	41.69	49.23
Umhlangeni	—	—	5.95	7	2.17	26th	—	—
Hilton	82	34	3.59	7	2.91	24th	40.87	43.30

Coal and Labour Return.

Return of Coal Raised and Labour Employed at the Natal Collieries for the month of May, 1910.

COLLIERY	Average Labour Employed					Output Tons Cwt.
	Productive Work			Un-productive Work *	Total	
	Above Ground	Below Ground	Total			
Durban Navigation ..	273	915	1,188	20	1,208	24,732
Natal Navigation ..	387	695	1,082	17	1,099	24,148
Elandslaagte ..	292	711	1,006	20	1,026	18,380
Glencoe (Natal) ..	193	522	715	25	740	14,436
St. George's ..	241	434	675	—	675	13,042
Dundee ..	237	525	762	—	762	12,416
Natal Cambrian ..	188	185	373	31	404	12,234
South African ..	169	449	618	13	631	11,867
Hlobane ..	137	353	490	51	541	10,522
Talana ..	111	348	459	22	481	8,518
Hatting Spruit ..	62	275	337	17	354	8,203
Burnside ..	84	232	316	201	517	7,419
Ramsay ..	88	169	257	3	260	6,382
Natal Steam Coal Co. ..	88	213	301	10	311	6,299
Newcastle ..	73	308	381	15	396	6,158
Ballengeich ..	87	137	224	13	237	4,523
West Lennoxton ..	46	77	123	—	123	1,928
Dewar's Anthracite ..	11	11	22	9	31	200
Makateese Kop ..	3	—	3	—	3	7
Totals ..	2,770	6,862	9,632	470	10,102	191,449
Corresponding Month, '09	2,461	4,823	7,284	300	7,584	125,170

	Productive Work			Un-productive Work	Total, May, 1910	Total, May, 1909
	Above Ground	Below Ground	Total			
Europeans ..	233	207	440	60	500	373
Natives ..	1,018	4,506	5,524	282	5,806	4,224
Indians ..	1,519	2,019	3,538	128	3,666	2,987

* Cost charged to Capital Account.

Mines Department, Pietermaritzburg,
7th June, 1910.

CHAS. J. GRAY,
Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal Bunkered and Exported from the Port of Durban for the month of March, 1910.

				Tons.	Cwt.
Bunker Coal ..	..	..	..	105,253	14
Coal Exported ..	..	..	..	25,890	19
Total ..	..	..	..	131,124	4

* Customs House, Port Natal
1st June, 1910

GEO. MAYSTON,
Collector of Customs.

Return of Farms at Present under Licence for Lung-sickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Uraw	Ladysmith	Scab	Natives	Roosboom
			"	Roopoor
			P. Reuten	Mt. Pleasant
			H. Nicholson	Ne herton
			Natives	Diefontein
			"	Elandslaagte
			B. J. Neima'er	Tylden
			D. A. Henry	Envogel Vlei
A. B. Koe	Portion of Estcourt		R. Mattison	Calcott
			W. Crouch	Oakhampton
			C. Hatting	Doornkop
A. C. Williams	Utrecht		C. Labuschagne	Haas' on ein
L. Trenor	Alfred	Lungsickness	J. T. Clothier	Wh tecliff
K. Wingfield Stratford	Newcastle	Scab	Natives	Location No. 2
L. G. Wingfield				
	Stratford..	Newcastle	Lungsickness	C. Kemp
		Scab	J. Watt	Highton
			G. Adendorff	Lombardy
			H. Vernon	Bosch Hoek
			W. sborn	Moodelaagte
			G. M. rais	Roo point
			Unknown	Kon ngsberg
			C. G. H. Luas	Normandien Pound
			Natives	Redcliffe
			H. J. Heern	No mandien
			J. V. Wade	Blackmore
			D. N. van Rooye	Macelesfield
			Natives	Les Kop
G. Daniell	Vryheid		"	Jubilee
			J. H. Kay	Mademoiselle
			Natives	Ve geneeg
			"	Trade
			"	Ill bone
			M. B. Curtis	Sandrust
			J. M. Kockmore	Braksloot
			P. Kroop	Apologie
			J. Volker	"
			E. J. Peckhlm	Are dia
			Natives	Nooitgedacht
			D. Swar	Aloeboom
			W. Landman	Driehoek
			Natives	Touls
			E. Symmons	Hartebeestbult
			Natives	Belin
J. B. Coope	Nkandhla & Ngutu		Natives	Telezi Hill
			J. A. de Waal	Nqudini
			John Mate	Itala Hill
			Petrus Mate	"
			Natives	"
			"	Insozi
			"	Sandwana
			"	Siyongo
			H. Fry	Kmpandhle
			Natives	Ngutu Town Lands
			"	Macelo
			"	lood River
			"	Mkonjane
			"	Selutshana
			"	Magabeni
K. Varty	Western Umvoti		F. R. Nel	Vermaak's Kraal
			H. S. Vermaak	Haartebeeste Laagte
			J. J. Nel	Bloughton
			J. & F. Nel	Bloekmendaal
			C. A. Charlewood	Cagleburn
R. Mayne	Eastern Umvoti & Krantzkop		Natives	Koalimatolo
			"	Rizim
A. H. Ball	Weenen		P. P. van Rooyen	Doornkloof
			D. P. Naude	Scottshoek
			L. J. van Rooyen	Blive
R. J. Marshall	Dundee		A. Ja sen	Sheepridge
			E. G. Wohliiz	Stille Rust
			H. Davel	Kib ring
J. F. van Rensburg	Ngotshe		P. J. C. Liversage	Toversnarsue
K. W. Larkan	Unisinga		J. Dedekind	Elands Leig

RETURN OF FARMS UNDER LICENCE, — (Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
K. Ripley	Emtonjaneni	Scab	Natives	Crown Lands, Beyela Magwaza
C. E. Walker	Portion of Estcourt	"	Wm. McFie	Crown Lds., R. dhill Highlands
A. Hair	City and Umgeni	"	S. F. Boshoff	Lowlands
J. Radford (acting)	Pan pietersburg	"	G. L. Combrink	Niekerksfontein
		"	J. Dekker	Zwaartkop Location
		"	F. Dekker	Politique
J. Ralfe	Lion's River	"	G. F. Bunting	View Holland
E. W. Bowles	Icopo	"	C. J. Webb	Rocky Glen
		"	W. Whitelaw	Glenmaize

Pound Notices.

NOTIFICATION is contained in the *Government Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified : —

ON THE 6TH JULY.

Ingogo—Twenty-two merino sheep, some branded T on right shoulder, others x in circle on near loin. Impounded on May 2nd by Natal Police, Spitzkop.

Mount Hope (Klip River)—(1) Three merino sheep, ewes, branded s. p. on left side, V cut out of left ear. (2) Merino sheep, ewe, branded s. p. left side, V cut out of left and right ears.

New Hanover—White mule, mare, aged. Marks 3. J. over U. left neck, black spots left and right neck, two black spots left shoulder. This animal is running on the farm of Mr. E. Bently, Sproxtton, York, and too wild to be driven to the pound.

Vryheid—Stray merino hamel, right ear swallow tail and slit on back of right ear, winkelhaak on back of left ear. Supposed to have been lost from a flock passing.

Woodstock (Bergville)—Seventeen mixed kafir goats.

ON THE 27TH JULY.

Pine Tree (Alexandra)—White sow, supposed to have strayed from a troop to Umzinto. Owner refuses to release.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

FEES FOR AGRICULTURAL ANALYSIS.

Scale of fees, which is subject to revision from time to time.				Scale I.	Scale II.
FERTILISERS AND FEEDING STUFFS :				£ s. d.	£ s. d.
Determination of 1 constituent	...	...	...	0 7 6	0 5 0
Determination of 2 or 3 constituents	...	...	...	0 15 0	0 10 0
Complete analysis	...	...	...	1 1 0	0 15 0
SOILS : Partial analysis of a soil in relation to its fertility				1 1 0	0 10 6
Complete analysis of a soil	...	...	...	2 2 0	1 1 0
WATER : Irrigation and drainage				1 10 0	0 10 6
VEGETABLE PRODUCE : Fodder, Ensilage, Grain, &c.				1 10 0	0 15 0
MILK, CREAM, BUTTER : Fat only	...	...	...	0 5 0	0 2 6
" " : Complete	...	...	...	0 15 0	0 7 6
WATTLE BARK AND TEA : Tannin				0 5 0	0 2 6
CATTLE DIPPS : Quantitative analysis of 1 to 3 principle constituents				0 10 0	0 5 0
INSECTICIDES :					
Qualitative analysis each constituent	...	...	...	0 5 0	0 2 6
Quantitative " " "	...	...	...	0 10 3	0 5 0

The Department reserves the right to publish the results of any analysis performed by it; and, where such is deemed of sufficient public interest, it will remain at the discretion of the Director to remit any charges hereunder.

TREES FOR SALE.

Orders cannot be accepted for a smaller number than 100 trees.

PURCHASE OF TREE SEEDS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

POULTRY.

Cockerels and a few Pullets of the following breeds for sale :—Buff Orpingtons, Wyandottes, Plymouth Rocks and Black Leghorns.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible :—

Admittance of Students to the School of Agriculture. —House Master, Cedara.
 Analyses of Soils, Fertilisers, etc. —Analyst, Cedara.
 Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests. —Chief Forest Officer, Isopo.
 Afforestation, Timber Trees and Seeds. —Chief Afforestation Officer, Cedara.
 Agricultural Seeds, Livestock, etc. — Farm Manager, C.X.F., Cedara.
 Tropical Plants, Seeds, etc. —Manager, Government Farm, Winkle Spruit.
 Agricultural Seeds, etc., for Irrigation Farming. —Curator, Govt Station, Weenen.
 Fruit. —Orchardist, Cedara.
 Accounting Business. —Accounting Clerk, Cedara.
 Woollen Sheep, Woollen Classings, &c. —Wool Expert, Cedara.
 Apiculture —Apiarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry, Cedara.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
 Commissioner of Mines.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 115.—Englishman, 26 years of age, steady and an abstainer, with a knowledge of cattle and horses, wishes employment on a farm in Natal (English preferred) as a handy man, with a view to furthering his knowledge of farming in this country. Is willing to accept food and clothing in a good home, for services, for a few months with the prospect of a small wage after the first three months.

No. 117.—Englishman, 25, of good education, desires appointment as overseer on a plantation in Natal, and would pay a reasonable premium and give services free for a few months if necessary. Has had commercial, engineering, surveying and mining experience.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 121.—Desires open air employment. Age 43. Life experience of agricultural pedigree and prize stock gained in Scotland. Has been six years in South Africa. First-class references and testimonials. Small salary required.

No. 122.—A young man, with life-long experience of cane-growing, desires employment as manager or overseer on a plantation. Experience has been in Queensland and Fiji. Is good at figures and capable of taking charge of books if necessary.

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127. An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement after 25th April next. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 128.—Wishes to secure employment on a farm. States that he has a general knowledge of engineering, and has been employed on a large and well-known farm in the Richmond Division.

No. 131.—Age 20. Was a student at College of Agriculture, Cape Colony, where he gained a diploma. Has also won prizes for butter making at the Rosebank and Port Elizabeth Shows. Has been in the services of the Orangia Creamery Co., Bethlehem, which he left on account of conditions of employment not being suitable to his requirements.

No. 132. Age 37. Has had nine years experience as Assistant and Manager on Tea Estate in Assam, and has a thorough practical knowledge of tea making in all its Departments. Would like to obtain an appointment in a Tea Garden in Natal. Has a knowledge of several Indian languages.

No. 133.—Desires appointment as Farm Manager. Has had a thorough knowledge of growing and packing fruit, also lucerne growing and hay making. Has also had experience in Ostrich and Stock farming.

No. 134.—Age 37. Wishes to obtain experience on an Ostrich farm for a year. Would be willing to invest £700 at the end of the term of probation, and on the expiry of a year's partnership would be willing to increase that sum to £1,000.

No. 135.—Age 35. Has a knowledge of poultry and bee-keeping. Total abstainer. Non-smoker. Good references. Is anxious to get on to a farm.

No. 136.—Wishes to secure employment on an Ostrich farm. Very good references.

No. 137.—Understands carpentry and wagon making. Is anxious to secure a position on a farm.

No. 138.—A young man who has just completed a two years' course of study at Cedara, and who has also had four months' experience on a dairy farm, wishes to secure employment on a farm—stock or mixed farm preferred.

No. 139.—Age 25. Seven years' experience in mixed farming in Springfield District.

No. 140.—Age 25. Colonial born. Has had 3 years experience on farm. Two years in the Mooi River Division, and one year Dairy Farming in the Transvaal. Good references; speaks Zulu.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

EMPLOYMENT FOR GIRLS.

The Minister of Agriculture has received a letter from the Chairman of the Transvaal Land Settlement Board, stating that he has been asked by several correspondents in England if there are any openings in South Africa, such as in creameries, for girls trained at Bromsgrove Colonial College and other such training centres in England. We should be glad to hear from any institutions or farmers in Natal who may be in a position to offer situations to girls who have been trained at such Colleges, when we shall be pleased to place them in communication with the Chairman of the Transvaal Land Settlement Board.

Agricultural and Other Shows, 1910.

CAMPERDOWN (Camperdown Agricultural Society).—Show, 22nd July. Walker and Burchell, Camperdown, *Secretaries*.

DURBAN (Durban and Coast Society of Agriculture and Industry).—Show, 6th, 7th and 8th July, J. Morley, 399, Smith Street, Durban, *Secretary*.

DURBAN (Durban County Farmers' Association).—Hold no Show, but an Exhibit will be arranged for at the Show held by the Durban and Coast Society of Agriculture and Industry. F. J. Volett, New Germany, *Secretary*.

DURBAN (Durban and Coast Poultry Club).—Show 6th, 7th and 8th July. H. M. Fletcher, 20, Castle Arcade, Durban, *Secretary*.

MID-ILLOVO (Mid-Illovo Farmers' Club).—Show held under the Mid-Illovo Agricultural Society. J. W. V. Montgomery, Ismont, Mid-Illovo, *Secretary*.

NEW HANOVER (New Hanover Agricultural Association).—Show, 18th August. W. D. Stewart, New Hanover, *Secretary*.

RICHMOND (Richmond Agricultural Society).—Show 20th July. Entries close, 30th June. C. Williams, *Secretary*.

SOCIETIES HOLDING NO SHOWS.

Byrne Farmers' Association; Boston Farmers' Association; Donnybrook Farmers' Association; Drunk Vlei Farmers' Association; Garden Castle Farmers' Club; Greytown Horticultural Society; Ladysmith Farmers' Association; Malton Farmers' Association; Polela Agricultural Society; Seven Oaks Farmers' Association; Umsinga-Biggarsburg Farmers' Association; Utrecht Boeren Vereeniging; Vryheid Agricultural Society.

Frere Dipping Association; Alfred County Farmers' Association and Agricultural Society.

Farm Apprentices' Bureau.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | | |
|-----|-----|---------|--|
| No. | 3. | Age 24. | Colonial born. Has a knowledge of bookkeeping. |
| " | 15. | Age 19. | Is desirous of learning farming. |
| " | 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. |
| " | 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. |
| " | 35. | Age 21. | Has had five years' experience on farms. Understands cattle and horses and Agriculture. Is anxious to get back on a farm. |
| " | 40. | Age 24. | Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm. |
| " | 46. | Age 21. | Served a term of apprenticeship to a firm of agricultural implement makers. Industrious and level-headed lad. Very good references. |
| " | 47. | Age 21. | Is anxious to obtain a situation on a farm. Has been in ironmongery trade for 2½ years. |
| " | 53. | Age 17. | Has had 18 months' experience of farming in Zululand. Speaks Zulu. Understands cattle and horses. |
| " | 54. | Age 18. | Has had 18 months' experience of farming at Harrismith. Speaks Zulu and Dutch. Understands cattle and horses. Is anxious to get back on a farm. |
| " | 55. | Age 16. | Has had a little experience. Speaks Zulu. Understands carpentry. Has been engaged in a Solicitor's office for four years. Is very obliging and willing. Anxious to get on to a farm. |
| " | 56. | Age 20. | Strong, tall and healthy, good rider, fond of stock, and has had some years experience of general farming. Small salary required with board and lodging. |

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

Charges in respect of Cattle and the Meat of Cattle.	Calves up to one year old.	Cattle over one year old.	
		Rate per single head.	After reaching 100 head in month.
<i>Abattoir.</i>	s. d.	s. d.	s. d.
1. Receiving, per head... ..	0 3	0 6	0 3
2. Killing and Dressing, per head	2 0	3 6	2 9
3. Disinfectants	0 1	0 1	0 1
4. Cleaning Tripes, each	0 6	0 6	0 6
5. „ Sets Feet, per set	0 6	0 6	0 6
6. „ Calves' Heads, each	0 9	—	—
<i>Bagging Charge</i>			
1. Per Body of Beef	1 3	2 6	1 9
2. Bagging Labour, per body	0 3	0 6	0 3
Hessian, 3d per yard.			
<i>Special Storage Rates for Chilling up to 72 hours.</i>			
1. Chilling Beef, per body	1 3	2 9	1 9
2. Chilling Offal, per set	0 6	1 0	0 6

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg, 21st December, 1908.

Bran and oats are said to be good material in which to pack eggs. The eggs must be fresh when they are packed and must be put into cold storage at once.



THE CURITYBA BACON FACTORY -- I.

Exterior View of Bariguy Bacon Factory, Curitiba, Parana, Brazil, the property of Senor Guilhorme L. Withers. The background is occupied by South Brazilian pine trees ; the factory has a capacity of about 100 pigs per week.

(See Article by Mr. Loudon M. Douglas).

*The Natal Agricultural Journal.****The End of the Maize Season.***

WE are now in a position to present our readers with a final estimate of this season's maize crop, based upon the last of the returns which have been sent us monthly through the courtesy of a number of our readers. We take this opportunity of thanking all those gentlemen who have so readily come to our assistance during the six months of the maize season and who have thus enabled us to watch the progress or otherwise which the crop has been making. With a few exceptions, these gentlemen have sent in their returns regularly each month, and the information which they have kindly supplied has been of great value to us.

We find, on examining the last reports we have received and including the particulars supplied earlier by those whose harvesting had been completed previously, that the total European farmers' crop in Natal is exactly the same as we estimated it to be at the end of May, in our last issue—namely, 660,000 muids, the general condition of the crop at the time of reaping being 2.32, which represents an average yield of four muids to the acre. The condition of the crop in each of the magisterial divisions of the Province will be found in a table at the conclusion of this article, together with the condition at the end of each of the preceding five months.

The following figures show how the crop this season has compared, month by month, with that of last year. It will be seen that our best prospects were in February, and that during March and April the crop went off 0.25 in condition, or nearly half a muid to the acre. In May, however, the crop rallied to 2.32 and remained thus to the end:—

At End of—	1910		1909	
	Condition	Yield	Condition	Yield
January	2.0	3.41	3.1	5.34
February	2.52	4.34	3.0	5.16
March	2.35	4.1	2.09	4.93
April	2.27	3.91	2.7	4.65
May	2.32	4.0	2.64	4.54
June	2.32	4.0	2.82	4.86

In the following statement the probable total crop, according to conditions at the end of each month of the season, is given, for 1910 and 1909, for purposes of comparison. It will be seen that we are a long way off last year's crop:—

At End of—	Probable crop—	
	1910 Muids	1909 Muids
January	570,000	886,000
February	720,000	856,000
March	675,000	770,000
April	645,000	770,000
May	660,000	750,000
June	660,000	800,000

We are now in a position to estimate the probable surplus which will be available for export from this season's crop. The consumption of the European crop in Natal is, we know, about 350,000 muids, so that we shall have about 300,000 muids for export purposes, as compared with 450,000 muids last year.

The following table shows the progress or otherwise that the maize crop has made in the various Magisterial Divisions of the Province throughout the season. In studying these figures it should be remembered that the four "conditions," "poor," "fair," "average," and "above the average," are represented by the figures 1, 2, 3 and 4 respectively, and that intermediate figures represent intermediate conditions:—

CONDITION OF CROP.

(Note.—A condition "above the average" is represented by the figure 4; "average" by the figure 3; "fair" by the figure 2; and "poor" by the figure 1; intermediate figures represent corresponding conditions.)

Division	Condition of Crop at end of—					
	Jan.	Feb.	March	April	May	June
Lower Umzimkulu ...	3'2	3'0	3'0	1'50	2'0	1'67
Alexandra ...	2'5	2'7	2'4	2'60	2'4	2'5
Umlazi ...	3'0	2'0	2'0	2'0	2'0	2'0
Inanda and Indwedwe ...	3'2	3'0	3'4	3'0	3'25	2'0
Lower Tugela and Mapumulo	2'4	2'5	2'5	2'50	2'5	2'25
Impendhle ...	1'0	1'2	2'0	1'50	2'0	2'0
Alfred ...	2'5	3'0	2'5	1'67	2'4	2'34
Ixopo ...	2'7	2'7	2'8	2'5	2'7	3'0
Richmond ...	2'2	2'4	2'4	2'28	2'6	2'25
Umgeni ...	2'4	2'4	2'1	2'14	2'0	1'88
New Hanover ...	2'4	2'4	2'4	2'59	2'8	2'2
Lion's River ...	1'8	1'8	2'3	1'82	2'0	1'8
Umvoti ...	2'2	2'5	2'5	2'29	2'2	2'8
Krantzkop ...	2'8	2'8	3'0	2'75	2'7	3'0
Underberg ...	1'0	1'0	3'0	1'0	1'0	1'0
Polela ...	1'0	2'0	1'5	2'0	2'3	2'0
Bergville ...	1'8	2'6	2'8	2'75	2'5	2'5
Estcourt ...	1'9	2'3	2'2	2'15	2'2	2'3
Weenen ...	1'6	2'0	1'7	1'67	2'0	2'0
Klip River ...	2'0	2'2	2'1	1'79	2'2	2'0
Umsinga ...	2'6	2'0	2'3	2'0	2'0	2'0
Dundee ...	2'2	2'5	2'8	2'23	2'3	2'3
Newcastle ...	2'2	2'4	2'4	2'0	2'1	2'4
Vryheid and Ngotshe ...	2'6	3'2	2'3	3'0	2'4	2'4
Utrecht ...	2'5	2'3	2'0	2'0	1'7	3'0
Paulpietersburg ...	4'0	3'4	2'5	4'25	2'7	2'7
Babanango ...	3'0	3'0	2'0	1'0	1'0	1'0
Eshowe and Mtunzini ...	2'5	3'0	2'0	2'0	2'5	2'5
Emtonjaneni ...	3'0	2'8	2'6	2'67	2'4	2'4



Sheep Shearing by Machinery.

AN interesting demonstration of sheep shearing by machinery was, we learn from the *Mark Lane Express*, recently given at the Royal Agricultural College, Cirencester, by representatives of Messrs. R. A. Lister & Co., of Dursley, Gloucester, with a new machine called "The Lister." "The Lister" is a $2\frac{1}{2}$ horse-power portable petrol-driven shearing outfit, comprising a travelling carriage, an engine, a water-circulating tank for keeping the cylinder cool, and four shears, which can be operated (by four different persons, of course) at one and the same time. The motive power is communicated to the shears (which are fixed at the end of flexible tubes) by friction rollers being brought into contact with the fly-wheels driven by the engine. As one friction roller can be attached to each side of the fly-wheel, it follows that two fly-wheels drive four shears. The fly-wheels run all the time the engine is in motion, but the shears can be each separately attached or detached, according to the number of operators available. Thus it is as easy to work all four shears at once as it is to work one, two, or three. The shear itself consists of a comb and cutter, and the effective power of the latter may be understood when it is stated that it rotates at the rate of 3,000 revolutions per minute. There is, of course, nothing novel either in the engine or in the shear itself; what is claimed to be new in "The Lister" is the application of the friction-driving device to the fly-wheel, by which the shearing apparatus is so smoothly and effectively worked. The simplicity of the apparatus is one of its chief recommendations. Another is its low consumption of petrol, this being only half a pint per horse power per hour. In other words, the engine being a $2\frac{1}{2}$ h.p., a pint and a quarter of petrol will keep the four shears at work for an hour.

The demonstration was conducted by Mr. Langworthy, an operator from New South Wales, where—at the Royal Show at Sydney last April—"The Lister" was first publicly exhibited. No delay arose in starting the engine, nor in switching on one of the friction rollers to the fly-wheel, and a Cotswold ewe having been lifted over the hurdle fence and

placed in the hands of the operator, shearing began within five or six seconds of the original start. The fleece was a thick and heavy one, but it was completely removed within seven or eight minutes, and a big-framed Wensleydale was afterwards sheared by Mr. Langworthy within six minutes. Mr. Kenneth Swanwick, as well as other students, subsequently tried their hand with the apparatus, three of the shears being kept going at the same moment, and though Mr. Langworthy's time was not beaten, the possibility of getting near to it with a very little practice was proved beyond doubt.

Importation of Bees into the Transvaal.

The following Proclamation, respecting the importation of bees from Natal and the Cape of Good Hope into the Transvaal, has been issued by His Excellency the Governor-General:—"Whereas by Section *six*, Sub-section (1) of Act No. 6 of 1909 of the Province of the Transvaal, it is provided that the Governor may by proclamation in the *Gazette* declare that paragraph (*a*) of Section *two* of the said Act shall not apply in respect of the importation from any colony or territory in South Africa of bees native of that colony or territory if therein a statute is in force prohibiting under a penalty not less than is mentioned in Section *five* of Act No. 6 of 1909 the importation of bees (except under special permission) from any place into that colony or territory. And whereas there is such a statute in force in the Province of the Cape of Good Hope and in the Province of Natal; Now, therefore, under and by virtue of the powers in me vested by Section *six* of the said Act, I do hereby declare, proclaim and make known that the provisions of paragraph (*a*) of Section *two* aforesaid shall not apply in respect of the importation from the Province of the Cape of Good Hope or the Province of Natal of bees native of those Provinces."

Entry of Cattle into Natal from Cape Province.

His Excellency the Governor-General has, under and by virtue of the powers invested in him by Law No. 13 of 1866 and the Animals Diseases Act of 1894 of the Province of Natal, proclaimed that it shall henceforth be unlawful for any person to introduce into the Province of Natal directly or indirectly any horned cattle from the Province of the Cape of Good Hope; provided, however, that cattle may be allowed to enter the Province of Natal under written permission from the Chief Veterinary Surgeon for the Province of Natal from such districts in the Province of the Cape of Good Hope as that officer may in his absolute discretion decide upon and subject to such conditions as he may see fit to impose. Natal Proclamation No. 29, 1908, dated 28th May, 1908, is repealed.

Export Rates on Grain and Fruit.

It has been officially notified that, in connection with an agreement which has been entered into between the Government of the Union of South Africa and the Conference Lines of Steamships, the Government have secured for shippers the continuance of the present export shipping rates over the period 1st July, 1910, to 30th June, 1911, for South African maize, Kafir corn, oats, fruits, and base metals. In addition, certain important modifications in favour of shippers have been agreed to by the contractors. As regards the rates for maize, Kafir corn, oats, and fruit—which at present are as follows:—From all S.A. ports and Delagoa Bay to Southampton, London, Hamburg, and Antwerp: maize, 11s. 6d. and 10 per cent. per ton (2,240 lbs.); Kafir corn and oats, 15s. and 10 per cent. per ton (2,240 lbs.); fruit, 25s. and 10 per cent. per ton of 40 cubic feet—the contractors have now undertaken to utilise such space as may be available in the weekly mail steamers to convey maize in quantities of not less than 100 tons to any one of the following ports: Bristol, Belfast, Cork, Cardiff, Cherbourg, Dundee, Glasgow, Havre, Hull, Leith, Liverpool, Middlesboro', Portsmouth, Rotterdam, and Swansea, at an additional charge of 3s. 6d. per ton of 2,240 lbs., plus 10 per cent. over and above the freight to the ordinary berth ports of Southampton, London, Hamburg, and Antwerp, the maize to be transhipped at Southampton to other steamers at the cost of the contractors. *Note.*—In connection with the above, it should be noted that the contractors are not bound, in the case of the ports of Hamburg and Antwerp, to carry parcels of less than 150 tons of South African produce.)

The contractors, while not guaranteeing to find space for all maize, Kafir corn, and oats as offering for shipment, yet undertake to use their utmost endeavours to do so. It is, however, understood that if more maize, Kafir corn, or oats are offered for shipment than the lines can provide space for on or about the date applied for, the shipper will be free to employ other means of transport without forfeiting any rebates which he may be entitled to claim from the Conference Lines, and without being subject to any other disability. "The Government wish to impress upon shippers that, in order to prevent delay in shipment, it is extremely advisable for them to utilise the space available in homeward-bound vessels during the months of July and August in preference to holding their shipments over until September and subsequent months when the space in the vessels is required for the transportation of wool, skins, and other more remunerative cargo than offering."

Value of Milk Records.

The following is a selection of some interesting opinions on the subject of milk records and their value, which have been collected from farmers in the State of Maine:—"I have the value of definite knowledge concerning ones business." "I have learned the value of method in conducting a dairy business." "I have learned that cows vary in food requirements." "I have learned that the cost to produce a pound of milk varies widely with different cows." "I have learned that the consuming often exceeds her producing capacity." "I have learned something of the part the food nutrients play in the economy of animal life and milk production." "I have learned much concerning methods of feeding." "I have learned the analysis of feed stuffs." "I have learned to have a genuine pride in good dairy cows." "I have learned the importance of breeding." "I have learned that breeding operations should be carried on with intelligence." "I have learned that fads have no rightful place in the breeding of dairy animals."

The Laboratory Dip (Formula).

On account of the number of applications which are being received, both by the Government Bacteriologist and ourselves for the formula of the "Laboratory" Dip, we think it well to re-publish the directions for preparing the dip, so that all who have not the formula by them may cut it out and keep it for future use. The directions, as drawn up by the Government Bacteriologist, are as follows:—To mix 400 gallons: $3\frac{1}{2}$ lbs. arsenite of soda, $5\frac{1}{2}$ lbs. of soft soap, and 2 gallons paraffin. Dissolve the soap in about 5 gallons of hot water; while still hot add this soap solution in small quantities at a time to the paraffin and beat or stir to a creamy lather. This makes the soap emulsion. Dissolve $8\frac{1}{2}$ lbs of arsenite of soda in a sufficient quantity (about a gallon) of hot water, and when completely dissolved add cold water up to 50 gallons. This mixture can be made in the tank. The soap solution may then be gradually added, stirring thoroughly the while. Water should then be added till the 400 gal. tank is full. When it is desired to fill the dipping tank the above procedure can be adopted for as many times as is found necessary, or one mixing may be made sufficient for the purpose. Four hundred gallons, however, is a sufficient quantity to handle at one time. If a film of oil floats to the top of the dip in the tank the dip should be stirred with a stick, or board, before commencing to dip, or the oil may easily be removed by skimming, the proportion of alkali present in the soft soap (a proportion varying with different samples) determining to some extent the degree of emulsification of the oil.

It is of great importance that arsenite of soda containing 80 per cent. arsenic should be used, as it has been found in the past that several failures have been experienced in the application of this dip by the use of unreliable arsenical preparations. Hard water should not be used in the mixing of the dip. The above instructions should be strictly adhered to when mixing. In the case of cattle not habituated to an arsenical dip, slight excoriation of the skin of the thighs and neck, etc., may be produced after the first dippings, but should this difficulty arise a dressing of the affected parts with oil or lard before dipping will permit of the animals being dipped at the five-day interval. It will be found that this intolerance rapidly disappears.

The parsnip is one of the best of all roots for milch cows. It is a very sweet root, and its extensive use in the island of Jersey has probably contributed largely to making the superior milk and butter qualities of the Channel Island cows.—(*Farmers' Gazette.*)

Bees are well known to have a rooted aversion to the odour of human perspiration: bee-keepers should therefore make a point of not handling their stocks when in a heated condition.

Shade is needed for pigs as much as feed and drink in warm weather.

It is often necessary to stir young pigs out of their nests during extreme cold weather in order to have them take sufficient exercise for health.

Salt, charcoal, and ashes are three things that can be kept before the pigs all the time. There is no danger of their eating too much. It is when they are deprived of their rest time that there is danger.

When the pig is three months old usually it eats 2.2 lb. of food a day; when seven months old it weighs five times as much, but eats only three times as much. Between four and five months of age the pig makes 50 lb. gain in thirty days from 120 lb. of feed. But after the pig is nine months old it takes three months to put on 50 lb. of pork from 630 lb. of feed. Which is the more economical? The only way to figure feed is in proportion to the live weight.

Bacon Curing in Brazil.

By LOUDON M. DOUGLAS,

Lecturer on Zootechny and Animal Husbandry, Edinburgh: Editor of Douglas's "Encyclopaedia" for the Bacon and Meat Industries: Joint Author of "The Meat Industry and Meat Inspection" (5 Vols.), etc., etc.

INDUSTRIAL progress in Brazil has been very rapid during the last half century, and in the States which border on the Atlantic especially there has been large industrial enterprise. In no part of the vast country has there been greater progress than in the South and in the States of Rio Janeiro, Sao Paulo, and Parana.

THE MEAT TRADE IN BRAZIL.

The climatic conditions of Brazil render it somewhat difficult to conduct the meat trade, and hence the development in that department of industry has been rather slow: the popular tradition existed not so long ago that, owing to the fact that Brazil is for the most part a tropical country, it would be difficult therefore to handle meats in any large quantities. This tradition existed at the time prior to the introduction of refrigeration, but, when artificial cooling effects became possible, the whole condition of things was altered, as refrigeration not only annihilates distance, but enables those who use it to be independent of the atmospheric temperature.

PIG BREEDING IN BRAZIL.

Curiously enough, a large amount of development has taken place in connection with the growing of pigs, this having come about more especially during recent years, and there seems very likelihood of the Southern States of Brazil developing into large producing centres for pig products. At the moment, however, the business has only commenced, and it is gratifying to be able to state that not only in the growing of pigs but in the manufacture of bacon and pig products, there has been unqualified success.

It may be of interest before proceeding, to detail what has been done, to examine the local conditions which exist in these Southern States of Brazil. In so far as the pig industry is concerned, and as what we have to say is more especially concerning bacon curing in the State of Parana, we will confine ourselves to the data which is available relative to that State.

THE STATE OF PARANA.

The State of Parana is one of the medium-sized States of Brazil, and contains about 60,000 square miles. It has a population of between



CURITYBA BACON FACTORY.—II.

Slaughtering Department showing the process of hoisting the live pigs on the slaughtering bar. After being bled, the pigs are thrown on to a dumping table, the leg chains removed and the carcasses rolled into a scalding vat ; after this they are tilted on to a scuttling table and the hair is scraped off. They are then singed, cleaned, and dressed.

(See Article by Mr. London M. Douglas.)



CURITYBA BACON FACTORY.—III.

After the pigs are singed and cleansed, the intestinal offal is removed and the carcasses are then allowed to hang until cool. The illustration also shows cases of bacon ready packed for Rio de Janeiro and in the foreground, native pine wood boards are seen. These have been sawn and planed ready for box making.

(See Article by Mr. London M. Douglas.)



CURITYBA BACON FACTORY.—IV.

When the carcasses have been slightly cooled and some of the animal heat dissipated they are severed into two sides. The illustration shows Mr. G. L. Withers examining the sides while they are hanging on the track bar.

(See Article by Mr London M Douglas).

400,000 and 500,000. Geographers generally describe it as being divided into three zones:—

1. The low coast strip below the mountains by the sea.
2. The upper tableland about 3,000 feet above the sea level.
3. The large forest that gradually descends from the tableland to the level of the large rivers which flow into the River Plate, the Paranapanema, Parana and Uruguay. To show the immense possibilities which lie in the future in this State, it may be mentioned that one-third of the territory is practically unexplored, and, so far as is known, is unpopulated, except by a few hundred wild Indians descended from the Aboriginal tribes. There are several other States throughout Brazil to which the same description would apply, and it would thus be understood that the possibilities of agriculture developing in this country offers many attractions to future generations.

In so far as the State of Parana is concerned, we may divide it into four different zones or divisions, namely:—

1. The coast strip, which is tropical, and in which bananas, oranges, sugar-cane and hard-woods are predominant. Along with these conditions a few pigs are produced. From the interior by the Serra do Mar, the State is divided by a range of mountains rising like a wall but covered over with forests, excepting the rocky peaks. Some of these latter rise to a height of 5,000 feet, and the passes between reach an altitude of between 3,000 to 3,500 feet above the sea level. Looking from the coast the distant mountains seem to rise sheer out of the water, as there are no smaller ranges of hills in the foreground to obstruct the vision.

2. The part of the Upper Plateau which is 2,500 to 3,000 feet high, and extends from 20,000 to 30,000 square miles, is covered by forests of pine trees and other timber, and, most important of all, Mate or Paraguayan tea. This is a product of the laurel or bay species, and is not unlike a bay tree in appearance. Mate tea is exported from Parana to the extent of between 30,000 and 40,000 tons per annum. Under such agricultural conditions it is interesting to note that very few pigs are kept, but this is not due to any inability to rear such live stock, but simply because the people prefer to work on the Mate plantations instead of at the rearing of live stock.

3. The third division consists of plains or campos which are devoted mostly to cattle raising, and pigs are not, as a rule, kept in any great numbers.

4. The fourth division consists of large tracts bordering on the forests, which are partially wooded and are useless for cattle except in some of the winter months on account of the stinging insects, flies, ticks, etc. These lands are prolific in various kinds of fruit trees and fruit-

bearing palms and pine trees, the nuts of which are something like chestnuts and are very abundant during three months of the year. Upon these fruits and nuts, with roots and very little corn—just sufficient to keep them coming to the homestead in the evening and thus preventing their becoming altogether wild—large herds of pigs are bred and sold at a year old and upwards, to the fatters from the maize districts, who come up to buy them according to the needs, taking them home, sometimes upwards of 50 miles, in droves.

These divisions of the State of Parana will doubtless in time become populated and developed by agriculturists, and the first step in this direction will be the utilisation of the unpopulated forests which at the present moment offer splendid opportunities to settlers who are not afraid of hard work.

In the State of Parana the growing of pigs has been abnormal, and in the districts of Assunguy, Serro Azul and others lying to the north-east and north-west of Curityba, swine husbandry has become quite a leading feature on the farms. Between these districts and the frontier of the progressive State of Sao Paulo, it is very mountainous, but at the same time is fertile. The district is not associated with the growing of Mate or timber, and has become more celebrated for the growth of maize, cereals and other root crops. Instead, however, of gathering these crops for export, the farmers of the country have made up their minds that it pays them better, owing to bad roads and long distances, to fatten pigs with their cereals, and thus a large district, amounting to several thousands of square miles, is practically devoted to the pig industry.

PIG BREEDING IN PARANA.

Under such conditions it is natural to enquire what kind of pigs flourish in this country, and it would seem that the breeds are rather a nondescript lot, and, from the point of view of modern pig husbandry, very unprofitable. These pigs are descendants of the original breeds brought from Portugal by the early colonists in the 16th and 17th centuries, and at that time there was no kind of selection at all, so that the breeds were simply introduced into the country in the most casual way. There are no records showing the growth and development of pig husbandry, nor do the oldest inhabitants remember having heard that any special measures were taken to specialise the different breeds. Consequently, at the present day, the distinctions which can be made are of an entirely arbitrary character, and don't compare with the specialised distinctions which exist, for example, in Europe. In Parana there are four classes of pigs, namely: 1, Very large; 2, large; 3, medium; 4, small-sized pigs, and to understand what these distinctions mean, it may be mentioned that the very large pigs are sometimes kept until they are five years old, when they become very fat and frequently weigh 1,000 lbs.

dead weight. From such weights they are gradually graded down in various sizes, weights and quantities, until they come to the small, hairless, thin-skinned pigs, with their small bones, little lean and a huge excess of fat. This small pig rarely weighs more than 180 lbs. when fattened to the utmost. The shapes and colours of the pigs are extremely varied, the greater part being black, which is the prevailing colour of pigs in all tropical countries. White pigs, as a rule, do not succeed where they are liable to be exposed to tropical suns. From the history of the pig-breeding industry, however, it may be surmised that there are animals of many colours in the country, and some of these are red, sandy grey, and many of mixed colours, indicating that there is no kind of selection in the breeding. It has been suggested, indeed, that the imported pigs have been crossed in a state of nature with the South American wild pigs, but the evidences of this are rather fragmentary.

It is interesting to notice that there are distinct races of wild pigs throughout the country, consisting of the Queixadas or Peccary, the Tattetos, and the ordinary domestic pigs—the latter having become wild through having escaped or through being abandoned by the breaking up of the homesteads of some outlying pioneer farmers. When the domestic pigs return to a state of nature, they get very savage in their dispositions, but don't seem to inter-breed with the Peccaries or Tattetos. These latter differ from the European pig in having a gland on the loin about the size of a threepenny piece in circumference, from which, when they are enraged, they emit a most powerful, nauseous odour. Upon killing them, this gland must be immediately cut out or the offensive smell will be absorbed by the flesh.

All these wild pigs will, with the progress of settlement, probably be exterminated in a few years, as they are not only very fair eating, which renders them a desirable acquisition, but they also commit frightful damage amongst the crops, not from what they eat, but what they destroy.

THE LOCAL DEMAND FOR PIG PRODUCTS.

All over Brazil there is a large demand for fat pork and lard, and this arises from the fact that the principal food of the people consists of black beans and rice, both of which are cooked with fat, and unless some such addition is made, to the beans especially, they are very insipid to the taste. Salted pork or pork fat are preferred, as they give a piquancy to these otherwise somewhat tasteless foods. It must not be supposed, however, that these foods are eaten because of necessity; they are simply national dishes and are preferred to any others.

BRAZILIAN PORK.

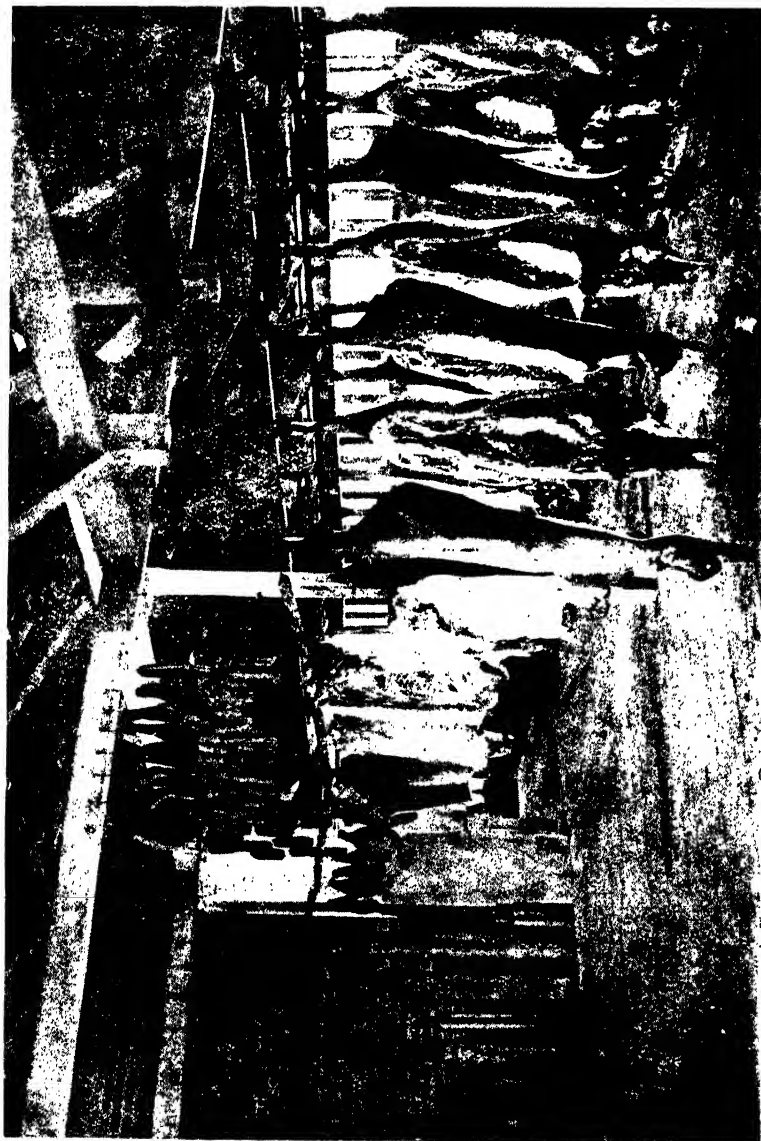
The preparation of Brazilian salted pork differs from the processes in use in other parts of the world.

After the pig is killed, the hair is burned off by means of pine spines where these are available, and where they are not, maize leaves are used instead. The carcasses are then laid on dried hides spread out on the ground, the vertebral column and skull being then cut out. The carcass is immediately dismembered and cut into two sides, after which the ribs, legs, shoulders and thick meat of the loin are cut out, two sides of fat varying from three to six inches in thickness at the top of the loin are then left, and these are dealt with as follows:--The sides are sliced from front to back, or longitudinally from head to tail, so as to form strips of about one inch thick, care being taken not to cut through the skin. All these cuts are then filled with salt, and the complete sides are rolled up with the jowl, including snout and ear, in the centre. After 24 hours, these sides are packed in panniers, and they are then ready for despatch and sale. This is the Brazilian bacon or Touchinho, as it is called, and when it is in perfect condition it is a very palatable meat, and, in the absence of refrigeration or modern cooling facilities, the process is probably the only one which would enable the meat to be cured under the climatic conditions. Unfortunately, in the remoter towns, where the process is carried out in a rough and ready way, there is a large proportion of tainted meat which is not only rancid, but may be also full of jumpers, and is frequently over-weighted with salt.

JORKED BEEF.

One of the notable products of Brazil, which has in the past been largely made, is that of jorked beef, which is simply the dried flesh of bullocks, the drying having taken place in the sun. This business, however, has fallen into considerable disrepute owing to the inability to preserve the meat, more especially during the thundery weather. So treacherous is the climate in this respect that it has been no uncommon sight to see thousands of pounds weight of jorked beef become tainted after keeping one night, notwithstanding that copious quantities of salt may have been added. To this particular business, refrigeration has hardly ever been applied, with the consequence that in the past there have been huge losses. The temperature during the day may rise to 85 degs. F. and fall again quite suddenly as low as 55 degs. F. during the night, but in the winter time it is no uncommon experience to find the temperature has fallen to 35 degs. F., although it would rise during the day to 70 degs. F.

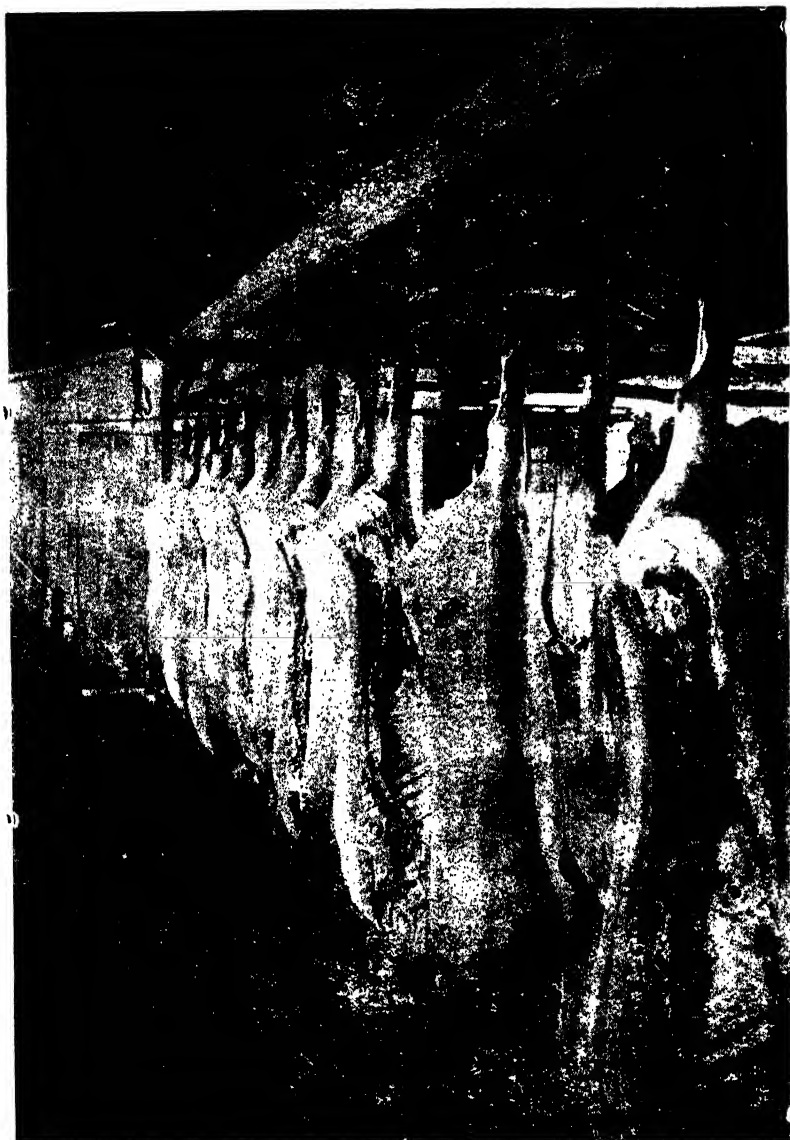
Such fluctuations in temperature are highly detrimental to the meat industry whether conducted in the fresh or preserved condition, and for this reason the successful curing of hams and bacon, without refrigeration, has been impossible. In fact, many attempts have been made to utilise the superabundant pig supplies for the manufacture of hams and bacon, in rural districts, but development in this direction has been dis-



CURITYBA BACON FACTORY.—V.

The carcasses are seen in this picture in the hanging-house on their way to the refrigerating chamber or chill room. Note the method of ventilation also at the sides of the building.

(See Article by Mr. Loudon M. Douglas.)



CURITYBA BACON FACTORY.—VI.

The quality of meat obtainable in Brazil is shown on this illustration and it will be noticed that the pigs are well matured and quite equal to those obtainable in Europe.]

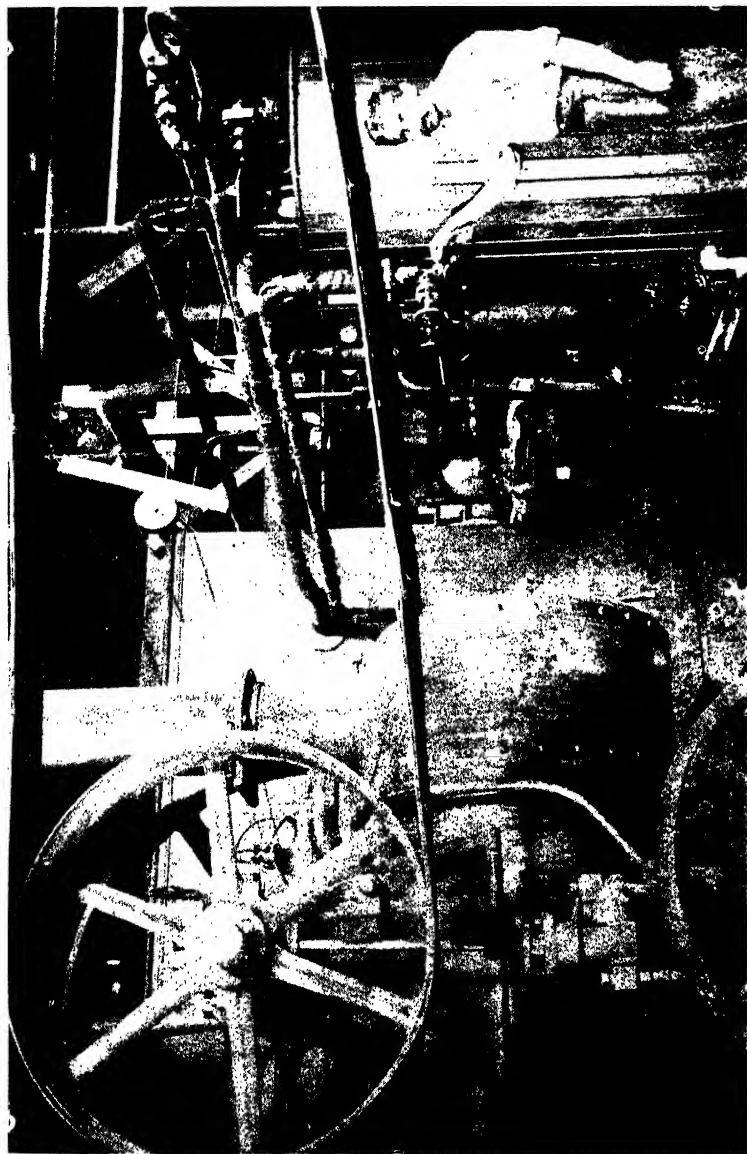
(See Article by Mr. Loudon M. Douglas).



CURITYBA BACON FACTORY.—VII.

(Most of the bacon and pig products in Brazil are cured in sections, the whole side not being much in demand, and it is usual to cut up the sides into such sections previous to putting them into the chill room.

(See Article by Mr Loudon M. Douglas).



CURITYBA BACON FACTORY. —VIII.

The refrigerating machine is the most important part of this factory and it is actuated by a locomotive type of steam boiler and engine combined. The refrigerator is a vertical type sulphurous anhydride low pressure machine. (See Article by Mr. London M. Douglas).

discouraged owing to the enormous losses through taint; the wet pickle process, or the pumping of pickle into the tissues, having proved quite valueless. Another local condition which militates against successful curing, lies in the uncertainty of the weather during winter. It is a common experience that after three or four days of frost, cold nights and a dry atmosphere might supervene, but these will be immediately followed by a steady downpour of rain which creates a damp, muggy atmosphere of a temperature of about 65 degs. F., which may last for four or five days.

PUMPING OF MEATS.

The process of pumping meats with pickle, which is so familiar in Europe and America, has had to be abandoned to a large extent in Brazil, owing to the treacherous climate. It has been found that pumping pickle into the tissues of the meats is very useful when these goods have to be consumed locally, but when they have to be prepared for export, the pumping seems to encourage putrefaction, and as a consequence hard, dry hams and bacon are the common articles of commerce.

EXPORT OR TRANSPORT TO A DISTANCE.

There is yet no occasion to look for markets for pig products beyond the Southern States of Brazil, and in Rio de Janeiro and Santos, as well as the local towns in Parana, there is plenty of outlet for the finished products that have so far been made. This, however, is not likely to last as, now that the developments in connection with the pig industry are likely to be much greater, it may be assumed that bacon and hams will in the future be exported to the United Kingdom and to other countries overseas.

PERSONAL DETAILS.

It will have been gathered from the foregoing notes that the pig industry has had a somewhat chequered career in Brazil. It is right to say, in fact, that in so far as the modern methods are concerned, these have been practised only to a limited extent, and their introduction to the State of Parana is entirely due to the enterprise of Mr. G. L. Withers, of Curitiba. Mr. Withers comes of a family of meat purveyors, and his family for generations have been known in connection with the meat industry at Romsey, Hants, England, and Twickenham, Rickmansworth, and other places. Mr. Withers' father went out to Brazil a good many years ago in connection with the Parana Meat Coy. This company intended to supply salt beef and pork to the large number of sailing ships which at that time filled the Brazilian ports, especially Rio de Janeiro and Santos, and at the time the Meat Coy. looked like being highly successful. The absence of cooling facilities and refrigeration, however, together with adverse local conditions, proved fatal to the enterprise, but Mr. Withers, in the year 1877, with what was left of the Meat

Coy.'s appliances and stores, thought that he might start a business of his own. This he did, and in course of time developed a considerable local trade in fresh meats, and, notwithstanding the almost prohibitive conditions of curing and the absence of refrigeration, managed to send considerable quantities of bacon and *carne socca* to Rio de Janeiro and other places. In the winter time he also did a small business in bacon, hams and lard, varied with *carne socca*, or jorke beef, and in that way between 1877 and 1888 built up a good business.

From 1889 to 1890 Mr. G. L. Withers was absent from Parana, having taken passages on a sailing ship from Paranagua for Valparaiso, where, however, he never arrived, for, in beating about off Cape Horn for some months in a foul bottomed ship, they made for the Falkland Islands for provision, and were wrecked in a gale at the entrance to the harbour at Port William. After staying at Port Stanley for a fortnight or so, Mr. Withers joined a steamer at Montevideo, from whence he sailed to England, and in that way came to have a knowledge of British methods in connection with the meat industry, and which he carried back with him to Brazil, and he had it firmly fixed in his mind that the only way to make the business completely successful was by the introduction of modern refrigerating plant and also the addition of modern appliances. Mr. Withers had had the advantage of receiving much of his education in the finer developments of the meat industry from an old Parasian Charcutier who was thoroughly up to the Charcuterio business, and knew quite as well as the deftest Parasian Charcutier how to make apparent "fillet" and "rump steaks" cut of clods and stickings.

Mr. Withers determined to build and equip a modern bacon factory, and with that end in view consulted Messrs. William Douglas & Sons, Ltd., of Putney, London, who subsequently designed and equipped the present factory at Curitiba, which has had from its start quite a remarkable career, and has demonstrated the possibility of successfully conducting bacon curing in a tropical country.

THE CURITYBA BACON FACTORY.

The bacon factory is designed so as to form one long building, and the various departments open from the one into the other so that the work can be carried on in perfect sequence.

The pigs are brought in in droves of from 50 to 100, and as they arrive from the surrounding country they are generally heated and fatigued owing to their being on the road sometimes from ten to thirty days' journey, travelling at the rate of 8 to 16 miles per day. The droves are driven to the factory from long distances on the hoof. It is therefore necessary to rest the animals, and for this purpose large enclosures are provided so that different droves can be separately accommodated in these enclosures. There is a plentiful supply of water

derived from a running stream, and this is a very needful requirement in the resting pens. In these enclosures the pigs are kept for several days, during which time they are supplied with a moderate quantity of food with plenty of salt, and are then ready for the uses of the factory. It is necessary that each drove should be kept separate, as when they are mixed the animals fight fiercely amongst themselves.

From the resting pens the numbers required for the day's work are placed in a fasting pen and are kept for a day without food, being supplied only with water, the number of animals thus handled being 20 to 30 on each alternate day. It is the custom to hang the carcasses overnight, and in the early morning they are cut up into hams, sides and belly pieces of bacon, according to the demand. The process of handling is similar to what obtains in other factories, the pigs being first of all slung on to a track bar, where they are slaughtered, after which the carcasses are scalded and the hair scraped from them. The carcasses are then singed in a singeing furnace and are again suspended on a track bar, where they are cleansed and the intestinal offal is removed. It is after this they are hung in the hanging house overnight and from which they are taken into the chill room in sections the next morning. The chill room is maintained at a temperature of about 38 degs. F., and the meat is brought down to about 40 degs. F. before it is taken into the curing cellar adjoining to be cured. The method of curing is practically the same thereafter as is followed out in Europe. A pickle of specified density (about 95 degs. to 100 degs. on Douglas's salinometer) is previously prepared and kept in readiness, but the meat is not put into this pickle right away, as it has been found that it suits the local market better when the meat is first of all dry salted for about a week and is then put into the pickle for the remainder of the curing, which may extend to 14 days. The temperature of the curing cellar is kept about 42 degs. F. and the amount of tainted meats produced is quite trifling. In so far as the salt used is concerned, this is the Brazilian sea salt from Mossere, in the north of Brazil. When the curing is completed, the hams and bacon are thoroughly washed and allowed to drain a short time, after which they are hung up in the smoke houses, where they remain till they are thoroughly dry and present a dark golden colour. After this they are branded and packed in grease-proof paper in boxes containing 12 hams or, as the case may be, about 130 lbs. of bacon. These are the recognised packages for shipment, the wood of the boxes being of a nice smelling hard wood. In so far as the utilisation of the by-products is concerned, very little has yet been done. Sausages are produced in small quantities, but no serious effort has yet been made to produce these on a large scale, although this will certainly be tried in the future. Certain sausages, however, which are popular in Brazil,

such as Lyons Saucissions and Bologna Salami cannot be profitably made owing to the humidity and variability of the climate.

Lard, however, is a very remunerative product; all fat and trimmings available are rendered down for local consumption.

It will thus be seen that this factory at Curityba has supplanted the old methods in use in Brazil, and it seems not unlikely that in the near future the old method of preparing Touchinho will only be found in farmers' houses in the remote rural districts.

THE MECHANICAL EQUIPMENT.

As we have indicated, the factory is divided into different departments consisting of the abattoir, hanging-house, chill room, curing cellar, drying room and smoke stoves, and in all of these the mechanical equipment is complete and is quite modern.

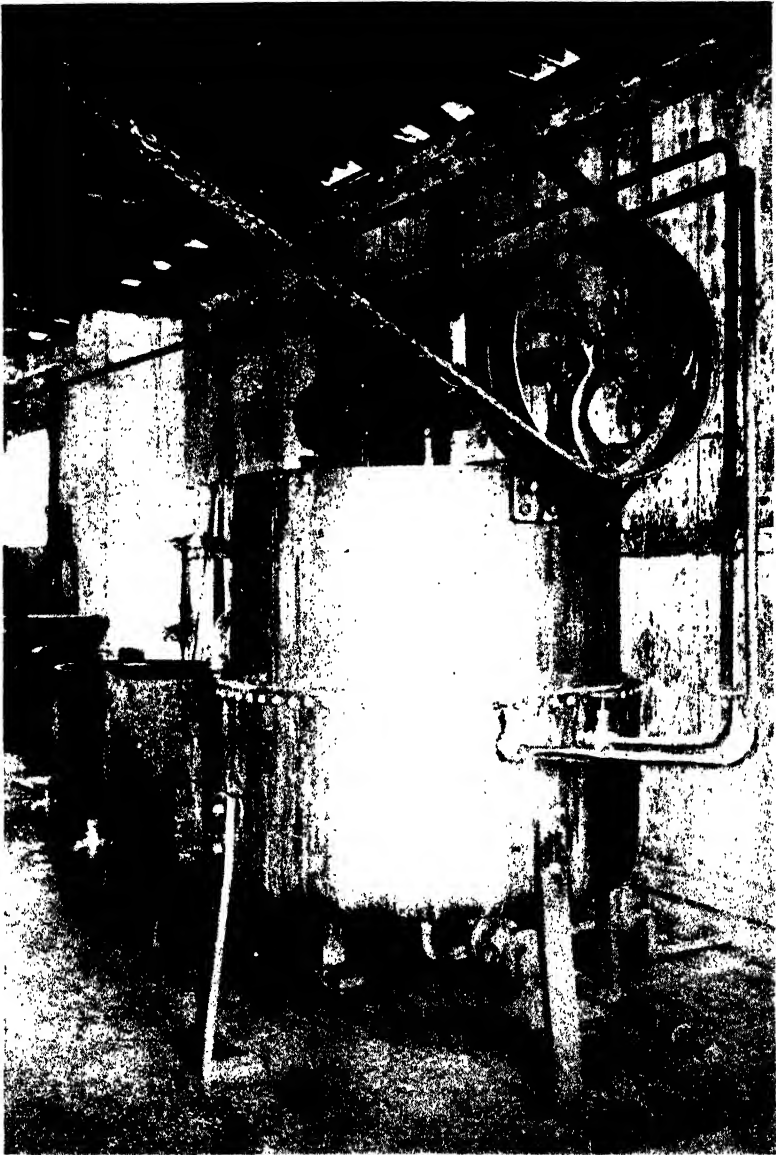
The steam power is generated from a locomotive type of steam boiler to which is attached a powerful steam engine, which in turn drives the refrigerating machinery, lard agitator and sausage machinery. Adjacent to the slaughter-house is the singeing furnace, which is of the horizontal type, and the refrigerating machinery consists of a vertical type Douglas sulphurous anhydride refrigerating machine, which is connected to an air cooler in the chill room and also cools the brine which is circulated in the curing cellar, which produces a constant temperature of 12 degs. F.

The minor appliances of the factory consist of tracking, smoke stove fittings, lard and sausage house equipment and sundry smaller appliances such are found necessary in conducting this business. It is worthy of remark also that although the refrigerating machinery is working constantly with water at a temperature frequently far above the normal, there has been no evidence of lack of efficiency.

THE OLD METHODS AND THE NEW.

Such a development as we have sketched out is one of great moment to a country like Brazil, inasmuch as it has been demonstrated that modern methods are likely to succeed where the ancient methods have proved an abject failure. In this small factory it is shown from day to day that prime quality of wholesome meats can be produced without danger of taint, which was ever present with the old fashioned methods, and it has also been demonstrated that this result has been accomplished mainly through the application of refrigeration and cooling effects.

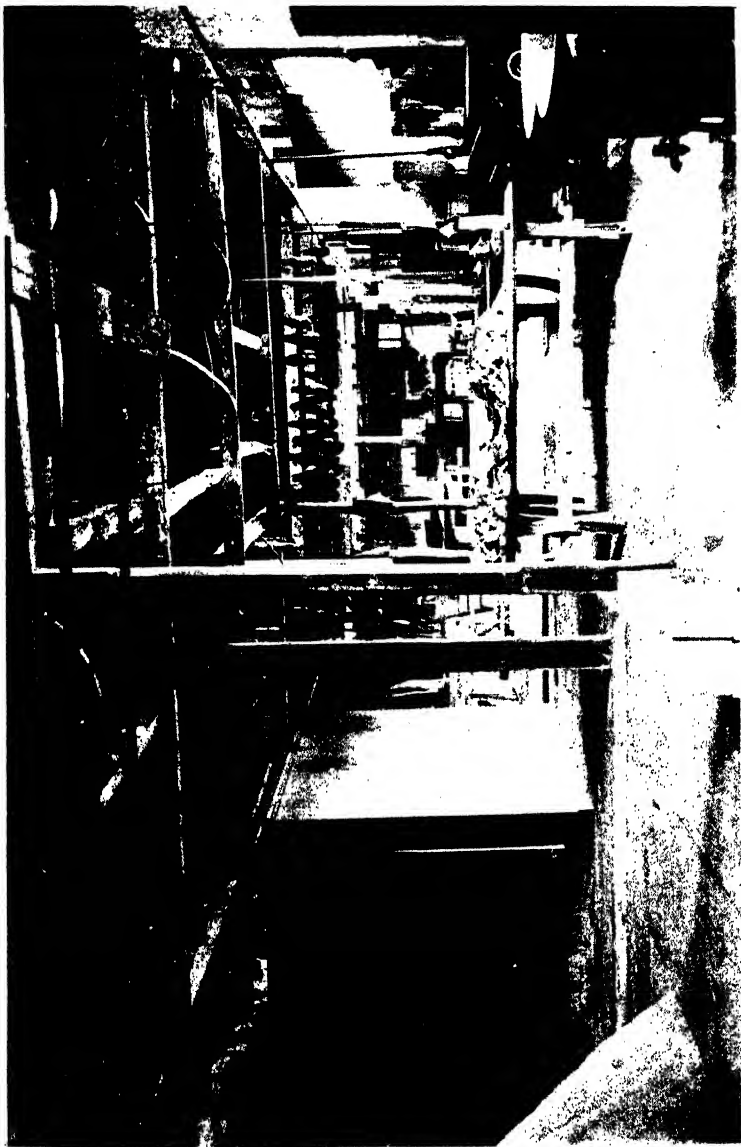
In the cheese or butter dairy the condition of the dairy floors may be kept sweet and clean by well scrubbing them daily with hot water and a liberal use of soda in it. A hard brush or broom should be used to get rid of all the dirt. The floor should afterwards be "swilled" down with boiling water and dried up with a mop or large "squeegee."



CURITYBA BACON FACTORY.—IX.

The Lard Department is a very important one in a factory like this, where the demand for lard is very great, hence the lard plant is complete and consists of lard cutter, refining pans and lard agitator.

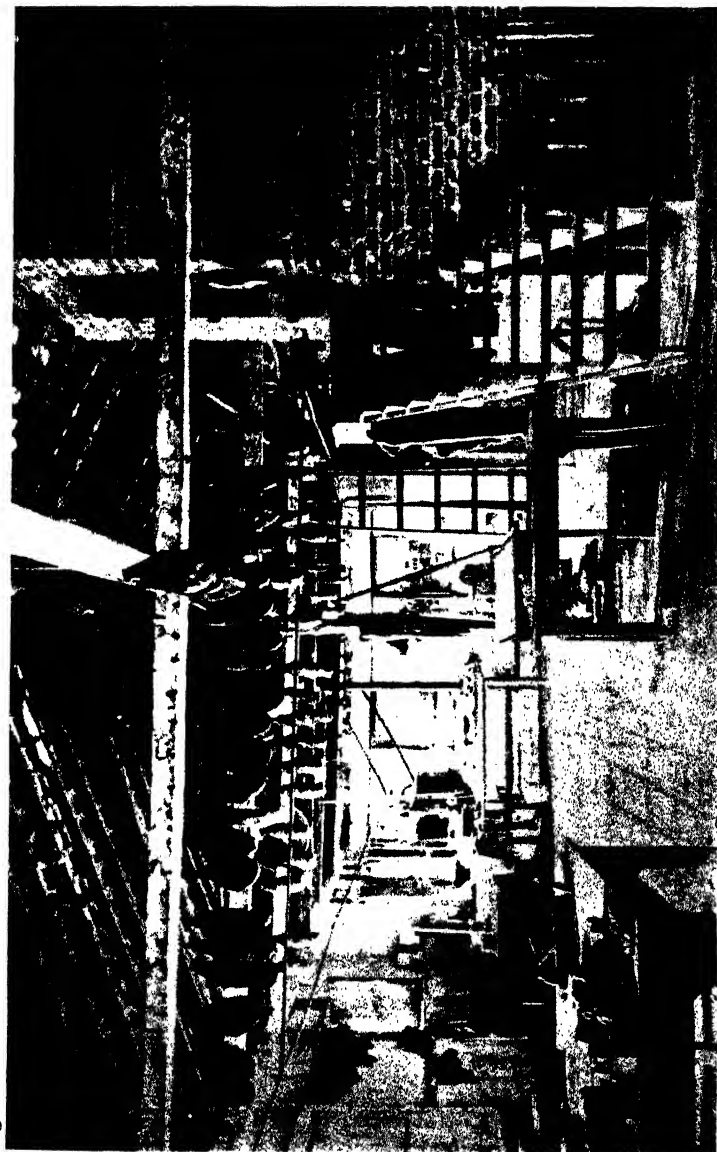
(See Article by Mr. Loudon M. Douglas).



CURITIBA BACON FACTORY. X.

Previous to smoking the pig products in the shape of hams and bacon, these are partially dried in a specially constructed drying room in which the temperature is maintained at about 85 to 90 F. The drying room is shown on the left hand.

See Article by Mr London M. Douglas.



CURITYBA BACON FACTORY.—XI.

The final process in making bacon and hams consists in smoking these products and this is carried out in a brick-built smoke stove shown on the right side, where the smoking effect is produced by hard wood sawdust. The main hall of the factory is also seen in the illustration.

(See Article by Mr. London M. Douglas.)

Live Stock Insurance.

HOW TO FORM MUTUAL INSURANCE CLUBS.

IN previous issues of the *Journal* we have referred to the subject of the mutual insurance of live stock, and have published a quantity of information on the subject, especially regarding the systems in force in other countries. We have now received an interesting leaflet on the subject, issued by the British Board of Agriculture, which contain some very useful information. *Inter alia*, attention is directed to the following points, which should receive careful consideration in drawing up the rules of the society, whether registered or unregistered.

UNLIMITED LIABILITY.

In the case of registered societies the liability of each member for the engagements of the society is unlimited, and this might lead to serious difficulties if the society were to undertake the insurance of animals, such, for example, as valuable pedigree stock, to a greater amount than its funds would justify. In, practice, however, such societies are understood only to undertake insurances for small amounts, and the risks incurred are, therefore, not great. It is desirable, however, that the rules should specify the maximum value which may be paid to any one case.

AREA COVERED BY THE SOCIETY.

It is generally found desirable to limit the operations of the society to a comparatively small area, such as a few adjacent parishes. It is thus possible for all the members to know each other, while the cost of management can be reduced to a minimum. If, on the other hand, the members were to be distributed over any considerable area, the duties of inspection, valuing and marking might become somewhat onerous, and the necessary protection against fraud or intentional neglect, which is afforded by intimate acquaintanceship among the members, would be wanting.

One objection to the small area covered by a society is that in the even of great mortality, such as an epidemic of contagious disease, it may be unable to afford help when it is most needed. It might be desirable to provide for such a contingency by a rule to the effect that if the demands on the funds owing to an epidemic exceed the total amount of the funds in hand, the proportion of compensation payable may be reduced. Many clubs provide for a levy on all the members equally in the event of the funds being insufficient. The objections connected with the limited sphere of operation could be removed by re-insurance, but

although this is common on the Continent, it has not up to the present been practised in this country.

COMPENSATION.

In the case of cow clubs, compensation is frequently paid at the rate of three-fourths of the full value, but in some the value is allowed up to, but not exceeding, £10, with a lower limit for calves. In the case of pigs it is not uncommon to pay the full amount at which the pig is valued. On some grounds it would seem desirable that something less than the full value should be paid.

The valuation is usually made by a committee immediately on the illness of the animals being reported by the owner. On the Continent, however, animals are frequently valued on entry into the society, and this is, perhaps, the more reasonable procedure. It is also desirable from other points of view, as should the animal be attacked by a contagious disease, the visit of a valuing committee might lead to the spread of infection.

COMPENSATION IN THE EVENT OF COMPULSORY SLAUGHTER.

In the event of the compulsory slaughter by order of the Government of any animals insured in the society, the compensation payable by the society would only be the difference, if any, between the sum for which the society was liable in the case of death, and the amount actually paid by the Government. It is, therefore, to the advantage of the club to insist that its members promptly report to the authorities suspected existence of any disease scheduled under the Diseases of Animals Acts. This should be provided for in the rules, and it might with advantage be laid down that no compensation should be paid for loss in the event of a member failing to report, as required by the order of the Board of Agriculture and Fisheries, the suspected existence of any such disease.

EMPLOYMENT OF A VETERINARY SURGEON.

Some clubs undertake to pay the fees of a veterinary surgeon called in to attend on sick animals, provided the necessary authority is first obtained from the committee of the society. It would probably be convenient to arrange with a veterinary surgeon to attend in such cases at a fixed fee.

PRECAUTIONS IN CASES OF CONTAGIOUS DISEASE.

When an animal is taken ill, it is usual for certain members of the society to inspect and value it, but should the disease be of a contagious nature there is a great risk that it may be unintentionally spread in this way. It is very important, therefore, that members thus employed should take the precaution of thoroughly disinfecting themselves upon leaving the cow-shed or pig-sty where the ailing animal is housed. They should wash their hands with soap and water, and their boots with a solution of carbolic acid or with some other suitable disinfectant. This is especi-

ally necessary in the case of pigs, owing to the possibility of the disease being swine-fever.

METHOD OF RAISING FUNDS.

There is commonly an entrance fee and a fixed annual subscription for each animal, in addition to a charge for inspection and marking on entry. This system has the advantage of simplicity, but it is open to the objection, particularly in the case of cows and horses, that the owner of a high-priced animal pays no more than the owner of one of less value, though in the event of loss he would receive considerably more from the society's funds. This objection could be removed by the valuation of each animal on entry into the society, and its annual re-valuation, with the adoption of a scale of premiums proportionate to the value. This system is frequently adopted on the Continent, and in the event of the accumulation of a large reserve fund the premiums are reduced. From the experience of a large number of societies in Bavaria, insuring in all over half-a-million animals, chiefly cattle, a premium of $1\frac{1}{2}$ per cent. of the insured value, or 3s. for every £10, has, on the average, proved sufficient.

RESERVE FUNDS.

The accumulation of a substantial reserve fund is undoubtedly desirable as a protection in the event of an epidemic of disease occurring in the neighbourhood, but it is very necessary that suitable provision should be made in the rules for the auditing of accounts, inspection of books, etc.

In the case of fraud by its members the only criminal remedy open to an unregistered society is confined to cases of larceny or embezzlement, but a registered society has a remedy on summary conviction against any person who obtains possession of any of its property by false pretences or who withholds or misapplies it.

COW CLUBS.

The following description of an existing society is offered as fairly typical of the method of conducting an ordinary cow club:—

The society consists of officers and an unlimited number of members, the officers being the president, vice-president, secretary, treasurer, marker, and a valuing committee of three members. The duty of the president is "to keep order during meetings, impose fines and see justice done between each member and the society"; the marker brands each cow entered, the brand being placed on the horn, or, if the animal be hornless, on the right foot; and the function of the valuing committee is to determine the value in case of illness or death of a cow. The secretary receives a small salary for his work.

The society does not retain the services of any particular veterinary surgeon, and the members can employ whom they please. If a member's

cow fall ill, the owner must report at once to the secretary, who forthwith advises the valuing committee, all of whom—or at least two of the three—go to see the cow as soon as possible. Directly the committee has appraised the cow and seen its condition it becomes the property of the society, and the committee can order its slaughter or can otherwise dispose of it. The full value of the cow as a healthy animal is fixed, and of this sum the owner receives 75 per cent., or 15s. in the £, the cheque on the society's banking account being drawn by the president, secretary and treasurer.

Any person wishing to become a member of the society must be proposed at a quarterly meeting. The entrance fee is 2s. 6d. for the first cow and 1s. for each subsequent cow. The subscription is 6s. per annum for each cow and is payable in monthly instalments; the cost of marking is 6d. per cow. Hence, after the first year the cost of insuring three cows would be 18s., irrespective of the value of the cows. A member on entering a cow and describing its age and colour, pays the entrance fee and subscription, and forthwith becomes entitled to the benefits of the club. Promptness in payment of subscriptions is insisted upon under penalty of forfeiting all advantages.

The majority of the members have from one to two cows, while some have three or four and even six cows insured.

On the average about 3 per cent. of the insured cows die during the year, milk fever being the principal cause of death.

As a protection against the entry of old cows of little value, it is provided that no cow is to be accepted for insurance which has had more than two calves, while if the marker suspects any cow, which he is asked to mark, to be unsound or diseased, he is required to refer the matter to the valuing committee. The fact that the marker is a practical cow-keeper is found in practice to be a sufficient protection to the society. Where cows are lost owing to any contagious disease, the owner is not allowed to enter others on the books of the society until the cow shed and adjoining buildings have been thoroughly disinfected.

In some societies the full value of the cow is paid so long as it does not exceed £10, and the subscription is 1s. a quarter, with 1s. entrance fee. The subscription for calves is 9d. a quarter and 6d. entrance fee, the compensation payable varying from £2 to £5. The number of animals belonging to any one member is sometimes limited by rule so as not to exceed seven, of which two must be calves.

The value of these societies to small cow-keepers may be realised from the fact that individual members have, occasionally, received payment within a comparatively short time for as many as four cows. The secretary of one of the largest of these societies states that the members are in all cases small holders, and he observes that "among such holders

the benefits of a society such as this are of the greatest—in fact, without some system of insurance small holders cannot exist, the loss of a cow being most serious to the man whose capital is but small.”

PIG CLUBS.

Pig clubs are conducted on somewhat similar lines, but they are usually composed almost entirely of cottagers and allotment holders. The number of pigs which may be insured by a single member is sometimes limited to three or four.

The entrance fee is frequently 1s. for each pig, sometimes 1s. in the £ on its value, and sometimes a fixed amount, such as 1s. 6d. per member. The subscription for each pig varies from 1md. to 1½d. per week, 3d. a month, or 6d. a quarter. An extra charge, usually about double, is made for insuring boar pigs or breeding sows, while sucking pigs are not admissible. The pig is marked on the ear, and the marker receives a few pence for his trouble. In case of illness the owner must inform the secretary, and a valuing committee then inspect and value the animal. The proportion of value allowed to the members varies; in some clubs it is 15s. in the £, in others 17s. 6d., and in others the full value is paid. A few clubs pay less for high-priced pigs; thus 18s. is paid for a pig worth £1: £1 15s. 9d. for a pig worth £2 and a smaller proportion for each additional £. The committee may, if they wish, dispose of the pig on behalf of the club.

The reserve funds naturally vary very greatly. Many clubs have funds up to £100-£150, but £20 to £30 is often considered a sufficient reserve fund for clubs with 40 or 50 members, and occasionally further profits are divided up annually after the manner of dividing clubs. Although the societies are formed for and rely entirely on mutual help, their income is frequently augmented to a small extent by subscriptions from honorary members.

Animals at pasture harvest their own rations and evenly distribute their droppings to maintain the fertility of the land. Pastures are indispensable in animal husbandry, and cheapen the production of dairy and meat products by allowing live stock to forage at will and harvest their rations.

Surely any intelligent breeder, who wishes to produce certain qualities in the offspring, will see that those qualities are possessed by the parents. The blood of the pure-bred sire is so strong that he will always impress himself on his offspring.

Methods of Applying Water to Crops.

By SAMUEL FORTIER.

*Chief of Irrigation Investigations, United States Office of Experiment Stations.**

AN irrigated farm resembles a city in that it should be skilfully laid out before permanent improvements are made. In such preparatory work perhaps the most important feature consists of the location and construction of the network of ditches required to carry and distribute water to all parts of the farm and the head gates, turn-outs, pipes, flumes, and road crossings which these ditches make necessary. Farm ditches are of two kinds, temporary and permanent. The former is intended to last through but one season, or for but one crop, and its location is not important. The latter should be as definitely fixed as any other permanent improvement on the farm. The location of all permanent ditches should precede the division of the farm into fields, the building of fences, and the laying out of farm roads and lanes. The chief reason for this course is that there may be but one direction in which water will flow at the proper rate of speed. Too often the mistake is made of building ditches for only a part of the farm. This is pretty certain to cause, it may be a year later, a complete change in most of the existing improvements or else a faulty arrangement of most of the essentials of an irrigated farm.

The head gate at the upper end of the supply ditch marks the point where the control of the canal company ceases and that of water users begins. Sometimes the water is measured out to the users.

Formerly all water channels pertaining to the irrigated farm were formed in porous earth which wasted a large part of the water through seepage. Wooden flumes were substituted later for part of the channels in earth, and pipes, concrete-lined ditches, and concrete flumes are now gradually taking the place of both earth and wood. The larger of the farm ditches in earth are made by first ploughing a few furrows and afterwards removing the loose dirt by means of a wooden implement formed like the letter A. The smaller ditches can best be made by a Lister plough attached to a sulky frame.

The location and construction of the principal water channels for the farm is followed by the preparation of the surface of the fields for irrigation. Four more or less distinct kinds of lands under ditch are undergoing the change. There is the land which has been devoted to grain growing under the natural rainfall. The second class consists of low-

* From the Year Book (1929) of the United States Dept. of Agriculture.

land covered by native grasses, cacti, or low bushes. The third comprises the heavy sagebrush land of the mountain States, while the fourth contains more or less shrubbery and small trees interspersed among smaller desert plants. In the first two kinds deep ploughing is all that is necessary before beginning the work of grading and levelling, but when heavy desert growths are encountered special contrivance must be used. A covering of sagebrush is most easily removed by dragging a rail or heavy timber over the field. The stumps which remain are either grubbed out by hand or are ploughed out. The mesquite of the South-west and pine and juniper trees of the North-west are grubbed out by hand or are removed by stump pullers, dynamite, or fire.

FLOODING METHOD.

Flooding the surface of land from field ditches or laterals is the most common way of wetting soil. This method is common in the Rocky Mountain States, and the conditions which prevail there seem to be well adapted to this mode of applying water. It can be used on quite steep slopes and in various other ways fits in with the requirements of the irrigator on the more elevated lands. It consists in levelling, grading, smoothing the surface of the fields to such a degree that water will readily flow over it. As a means of distributing the water over the field small ditches or laterals are located along the best routes. These form a network of channels which cut up the field into small strips, which are usually from 50 to 100 or more feet in width. Custom differs as to the direction of these field ditches. Sometimes they extend down the steepest slope of the field regardless of the fall at other times they follow grade lines and extend from the head ditch in more or less curved lines across the field.

In preparing a field for this method it is first ploughed and harrowed and then graded. Several good home-made implements are used to reduce the surface to an even, uniform grade. These have been described in publications of this Department. (Farmers' Bulletins 263 and 373.) A convenient implement to make field laterals is the Lister plough, either 14 or 16 inch, attached to a sulky frame and drawn by three horses. When the ditches extend down the steepest slope of the field they are located by eye, but when they are located on grade lines some kind of a surveying instrument is frequently required to establish the grades. A suitable fall for these small channels is one-half to three-fourths inch to the rod.

CHECK METHOD.

The check method consists in the division of the fields into checks or compartments, each having a comparatively level floor space surrounded by a low, flat level and a bordering supply ditch.

The checks are made in one or two more or less distinct ways. are known as the "rectangular" and the "contour." The boundaries of the former are straight, forming rectangles which are usually much longer in the direction of the least slope, while the boundaries of the latter conform to the natural slope of the land.

The field should first be carefully surveyed and the margins of the checks marked by a plough furrow or in some other way. The levels are formed by scrapers, which remove the earth from the high parts of the floor and deposit it on the levels. Levelling devices of various kinds are subsequently used to grade the floor and trim the low embankments. An essential feature in checking land is to arrange each tier of checks in such a way that each can be flooded from a supply ditch. Wooden gates in the ditch bank admit the required amount of water.

BASIN METHOD.

In all essential features the basin method does act different from that just described. The fact that basins are used in the irrigation of orchards and checks in the irrigation of alfalfa, and the further fact that basins are much smaller and last but for one season, have served to distinguish them and to accord to each a separate place.

Orchards are prepared for irrigation by this method by forming ridges of the loose earth midway between the rows of trees in both directions in the manner shown in figure 10. These ridges are made with ordinary walking ploughs by throwing up two furrows or else by a ridger. When the top soil is light and free from weeds only the ridger is required, but in more compact soils and on soils covered with weeds the surface should first be disced. This method is well adapted to the warmer portions of California, Texas, Arizona, and New Mexico, where the winter irrigation of orchards is becoming a fixed practice. Water is then abundant and large quantities can be applied when the land is thus formed into small compartments.

BORDER METHOD.

One of the most common ways of fitting the surface to be flooded is to divide each field into narrow strips or "lands" by means of low, flat ridges of earth. These ridges extend from the head ditch at the upper margin of the field down the steepest slope to the bottom. When the slope is too steep they follow a diagonal course. In either case the field is divided into bands or borders, each of which is watered separately. Figure 11 shows a portion of the head ditch having three gates, through which water is flowing into as many borders. The tract is first ploughed or disced and then laid out in narrow parallel strips by plough furrows, which mark the locations of the levels. On an average the levels are spaced about 50 feet apart and extend for a distance of 500 or more feet. They are usually formed with a scraper, which is driven back and forth

in a direction at right angles to that of the markings, and as each full scraper crosses a marking it is dumped and the surface is again skimmed over to collect earth for the next level. The ridges or levels thus formed are too steep and irregular and they are trimmed and flattened by suitable implements until their height is not more than 8 to 10 inches and the base is 6 to 7 feet wide. The land between the levels is carefully levelled and graded so as to permit water to flow in a thin sheet from the top to the bottom of each border.

FURROW METHOD.

With the exception of flooding from field laterals, the furrow method is more generally employed than any other. In its main features it is extremely simple.

There is only the making of a furrow in cultivated soil for the passage and absorption of a small stream of water. From so simple a beginning many modifications have been evolved, most of which pertain to devices employed to distribute water among the furrows.

The common practice among unskilful irrigators on poorly prepared fields result in an uneven wetting of the soil, waste of water, and reduced yields. Before watering such crops as orchards, sugar beets, potatoes, and corn, furrows are made with a light plough or cultivator. Water is then admitted into the head ditch at the top of the rows, its surface is raised by checks to the required height, and the furrows are supplied with water by making openings in the head ditch. The chief objection to this crude and inexpensive plan is the unequal distribution of water to the furrows.

A more even division of water among furrows can be made by using short tubes on the lower bank of the head ditch. These tubes are most frequently made of laths or slightly larger strips of boards, but may be made of cement, iron, or tin. By means of check gates, spaced near or far apart according as the grade is steep or flat, the surface of water is kept up to the proper height and the tubes are so placed that their upper surfaces will be on the same level and some little distance under water. Figure 12 shows the distribution of water from such boxes. In the North-west, where lumber is cheap, wooden flumes with small openings on one side are rapidly taking the place of earthen head ditches. These flumes vary in width from 8 to 12 inches, and the openings are controlled by metal or wooden gates in the manner shown in figure 13. Throughout the southern and central portion of California cement flumes and pipes of various kinds are quite generally used to distribute water to furrows. A common type of flume is shown in figure 14. In the process of building before the cement hardens, small metal tubes are inserted on the side next to the orchard, the flow through each tube being regulated by a gate of the same material. When pipes are used a line

is laid across the top of the tract to be watered at the proper depth below the surface, and at regular distances stand-pipes are inserted to bring the water to the surface, where it is dissolved between a number of furrows by special devices.

PIPE METHOD.

Where water is pumped from wells and where it is conducted from gravity canals under pressure, a convenient way of irrigating certain crops is by means of surface pipes. These pipes are made at the factory into convenient lengths, usually 10 feet, of various diameters, and of different weights and kinds of metals. When not in use they are stored in an outbuilding or shed and carted to the field which is in need of water. In the main feed pipe, which is laid underground across the top of the field to be watered, there are standpipes at regular intervals, and a length of the movable pipe is attached to the lowest standpipe, using heavy canvas hose to make the connection. To this length others are attached until a line extends on one side of the field to within a short distance of the bottom. When the water is turned on, a section of canvas hose serves to distribute the water down the slope and as far on each side as the hose will reach. Several lengths of pipe are then removed and carried over to an adjoining strip. The hose is again attached and another block of land watered. In this manner an entire strip on one side of the field is watered, and the pipe is again strung out in such a way that the strip next to the first can be watered.

IRRIGATING RICE.

In 1909 the farmers of Louisiana, Texas, and Arkansas received over \$18,000,000 for their irrigated rice crop. The well-drained, rich soil of that warm, humid region, when abundantly supplied with water at the proper time, is well adapted to the needs of this crop. Unlike most crops, rice must not only be flooded, but the top soil must be kept either continuously moist or submerged for a considerable part of the time. In the river sections of Louisiana two systems of culture, the wet and the dry, are employed. In the wet method the fields are flooded and ploughed in the water to a depth of $2\frac{1}{2}$ to 4 inches in April or early in May. The seed is sown broadcast and harrowed in, after which the water is turned off and the rice speedily germinates. In the dry method the land is ploughed, harrowed and seeded from the middle of March to the first of July in a manner similar to the treatment given other cereals. Under both methods a little water is turned on when the rice is 4 to 6 inches high. If the water is cold it must be used sparingly on early rice, while on late rice a sufficient depth of water must be maintained to prevent scalding. Unless the crop is attacked by insects the water after being turned on is kept on continuously until withdrawn previous to the harvest.

In the prairie districts of Louisiana, Texas, and Arkansas, where over 85 per cent. of the total yield of this country is grown, the fields are ploughed 2 to 3 inches deep at any convenient time between the harvesting of one crop and the planting of the next. Unless the soil is very hard no irrigation is needed before seeding. The most common varieties are Honduras and Japan rice, the acreage in the former being double that of the latter. Japan rice grows more slowly, requiring about fifteen days more time to mature. Advantage is taken of this to increase the length of the growing season, as well as that of the irrigation season, in order that the largest possible acreage may be handled by a given number of labourers. The time of seeding extends from the middle of March to July. The Honduras rice is planted first and there is usually sufficient rainfall to germinate the seed. In case irrigation water is needed to sprout the seed, it should not be allowed to remain more than a few hours or it will cause the seed to rot. Water, as a rule, is not needed on the Japan rice, or again on the Honduras rice, until the plants are from 4 to 6 inches high. Water is at first used sparingly, but the surface is flooded when the rice attains a height of 6 to 8 inches. As in the case of the river rice, the fields are continuously flooded from time to time until shortly before the crop is harvested.

• In the river districts of Louisiana the water required is obtained by siphoning it over the levees from the river, or, in case of low water, from pools into which it has been pumped. In the prairie districts large canal systems supplied by pumping plants and irrigating extensive tracts are common. The pumping plants operate against heads arranging from 10 to 70 feet, and are made of sufficient capacity to furnish 7 to 8 gallons per minute for each acre irrigated. One cubic foot of water per second would thus serve about 60 acres.

Modifications of the check method and preparation prevail throughout the rice districts. In the past the levees were far apart, but later practice has fully demonstrated the advantages of having three to five contours in each foot of vertical elevation instead of only two, as was the former custom. This allows a corresponding reduction in the height of the levees and the size of the checks. The lesson which experience has taught in the rice fields of the Gulf States, as well as in the San Joaquin Valley of California, is that the low levee with a broad, evenly trimmed base is best and presents the least obstruction to farm operations.

IRRIGATING ALFALFA.

Stated generally, Alfalfa is irrigated by flooding in the Rocky Mountain States, from furrows in the North West and in borders and checks in the South West of California. The amount of water, usually designated the "head," required for flooding varies from 50 to 200 miner's inches. This quantity is conveyed to the highest point of the field in a

supply ditch and is there divided among two or more field laterals, the number served depending on the total head. The least head for any one lateral is seldom less than 40 inches. When water is admitted into a lateral it is checked at a point 100 feet or more below the place of entrance. These checks may be earth, coarse manure covered with earth on the upstream face, canvas, or wood. The effect of any one of these checks is to raise the water until it flows over the low places or through openings made with a shovel. Any excess water is caught up by the next lower lateral and when the soil is thoroughly soaked to a depth of about 12 inches the check is either broken or removed to a point lower down of the flooding of the adjacent piece of land is begun. One man can water from about 2 to 5 acres in twelve hours.

The fine soils found in parts of the North-west have a tendency to run together and form a crust after water is spread over the surface. In order to prevent puddling and baking, which injure crops, the soil is moistened from furrows. The spacing of the furrows varies from 12 to 48 inches, depending on the readiness with which the water moistens the dry earth on each side of the furrow. Water is turned into these from head ditches, usually through spouts or tubes. When a field is properly prepared the task of irrigating by this method is easy. In sandy loam with furrows 500 to 1,000 feet long the water is allowed to run for about two days. At first a larger head is used, but after the bottom of each furrow is wet a smaller stream will suffice.

In irrigating Alfalfa in checks large heads are the rule. In the Modesto and Turlock irrigation districts of California 10 or more cubic feet per second is commonly used. With this head three or four checks, each averaging about three-fourths of an acre in extent, are flooded at one time, and in ten hours it is possible to irrigate 16 acres to an average depth of 6 inches. With such facilities for distributing and controlling water, the wetting of the soil becomes an easy and simple task.

In irrigating alfalfa in borders in the Yuma Valley, Arizona, a head of about 4 cubic feet per second is divided between 3 or 4 borders and the time required for the thin sheet of water to traverse a field 40 rods long depends on the slope, soil, crop, and thoroughness of irrigation desired. The usual time is one hour.

IRRIGATING GRAIN.

Grain occupies an important place in irrigated farming. Such crops as alfalfa, beets, potatoes, and fruit give much greater returns, but grain growing must needs be practiced to round out the requirements of most diversified farms under irrigation. To the new settler with little means it brings in quick returns; it is one of the best preparatory crops to sow on raw land, and it fits into the ordinary crop rotation of the West made up of grain, alfalfa, and sugar beets or potatoes.

Grains of all kind are irrigated mostly by the flooding method, but borders and furrows are also used to a limited extent. The process of flooding grain fields from field laterals is very much the same as that for alfalfa, except that the laterals are spaced closer. Less care is likewise taken in forming these channels, since they are not intended to last beyond one irrigating season. After the last watering, and before the grain is ready to harvest, the field ditches are filled in so as not to interfere with the reaper.

In the Yakima Valley in Washington grain is irrigated from furrows spaced 24 to 30 inches apart, and in the Imperial Valley in California it is flooded in borders about 50 feet in width and often a quarter of a mile long.

The low duty of water on grain land is due largely to the newness of the ground and the rough condition of the surface. Results of measurements made in different States of the West show that large quantities of water, often exceeding 6 acre-feet per acre, are frequently applied to grain fields. It is apparent from the low or average yields obtained that the greater part of the water is wasted. Under skilful use more than 2 acre-feet per acre is seldom needed.

IRRIGATING SUGAR BEETS.

The growing of sugar beets under irrigation is highly profitable when a heavy tonnage can be secured. To accomplish this desirable end, alfalfa fields are frequently ploughed under to make way for sugar beets, and when no rotation is practised the best soil is usually selected for this crop. Perhaps the best soil for sugar beets is a well-drained clay loam with just enough sand or silt in its composition to work freely. Deep ploughing is essential, and, as a rule, it pays to sub-soil. The two operations loosen the soil to a depth of 14 to 16 inches. Outside of California, sugar beets are irrigated by furrows. These start from a head ditch running across the upper margin of the field and extend down the steepest slope or diagonally if the slope be too great. The furrower may be used to form the furrows, provided the runners are spaced to correspond with the beet rows, and also provided that the soil is loose and free. Shovels attached to cultivators are, however, the most convenient implements for this purpose. It is well-nigh impossible to distribute water in long furrows, and for this reason their length should not exceed a general average of 350 feet. Fields that are 600 to 1,000 feet long should be provided with at least two head ditches, the lower one acting as a drainage channel for the upper half of the field and a supply ditch for the lower half.

Deep ploughing, thorough cultivation, levelling, grading, and furrowing should all be done with skill and care, but none of these is so difficult to manage as an even distribution of the water among

the furrows. In perhaps 90 per cent. of all beet irrigation too much water is forced into some furrows, resulting in flooding parts of the crop, which invariably suffers in consequence. Some device should be used to regulate the quantity of water entering each furrow. Each small stream should then be allowed to run until the absorption which goes on in its passage down the furrow has sufficiently moistened the soil around the roots.

As regards the right time to irrigate and the proper quantity to apply, the best guide is a close observance of the crop itself. Sufficient moisture should be given to the soil to enable the beets to maintain a steady, vigorous growth. When water is applied too early it produces leaves at the expense of the roots, and too late watering cause the plants to mature before they have their growth. A depth of 4 to 5 inches over the surface is usually applied at each watering, and the number of applications ranges from 2 to 4 in a season, the ground being cultivated as soon after each irrigation as practicable.

IRRIGATING POTATOES.

The growing of potatoes in a commercial way in some of the arid States is rapidly becoming an important industry. Its success is largely due to an interchange of other irrigated crops. A common rotation on the more fertile bench soils of Greeley, Colo., consists of grain as a nurse crop to alfalfa the first season, then two years of alfalfa, followed by two years of potatoes. In the San Luis Valley of Colorado the common field pea is substituted for alfalfa, the most common rotation being one to two years of peas, one to two years of potatoes, followed by one to two years of grain.

The rotation of crops in potato growing has an important bearing on the way in which the fields are prepared for irrigation and the manner of applying water. Neither the check nor the basin method is suitable, since potatoes can not well be flooded. The choice lies between furrows and flooding from field laterals, since it is easy to change from the flooding method followed in alfalfa, peas or grain to the furrow method followed in potatoes. In furrow irrigation the size of the field, the slope, and the character of the soil cause the length of the furrow to vary from a minimum of 200 feet to a maximum of 1,400 feet. From the standpoint of the irrigator it is not advisable to increase the length beyond 660 feet. Sometimes the furrows are not more than 6 inches deep, at other times they are 12 inches deep. A common practice is to have the bottom of the furrow about 12 inches below the crown of the plant. In most other respects the irrigation for potatoes does not differ from that of sugar beets.

IRRIGATING ORCHARDS.

Gently sloping land is preferred for irrigated orchards. A fall of 10 to 20 feet to the mile insures good drainage and the soil is not eroded by small streams of water. On very flat slopes the excess water from irrigation has frequently to be removed by artificial means and on very steep slopes the difficulties of applying water are much greater.

Furrow and basin irrigation are the usual methods employed, but the former is more common. In setting out land for commercial orchards a section is usually divided first into 40-acre divisions and then into 10-acre tracts. The lateral ditches supply the divisions, and individual owners control the respective tracts. When the width of driveways is deducted the length of a tract occupied by trees is seldom more than 600 feet. This distance governs the length of the furrows. The watering of orchard trees during the first season after transplanting is most commonly done through two furrows spaced 4 feet on each side of the tree. As the roots expand more furrows are added, and about the time the tree begins to bear the entire space between the rows is moistened, the number of furrows necessary to accomplish this depending on the soil, depth of furrow, cultivation, etc. It has been shown that evaporation is less from furrow than from surface irrigation, and that deep furrows conserve more water than shallow furrows. In citrus orchards, where water is valuable, a depth of furrow of 8 inches is common.

In conducting a supply of water along the upper margin of an orchard and in distributing the flow evenly among a large number of furrows, various plans have been adopted. Although the earthen ditch is still common, it is no longer regarded with favour. Wooden spouts or short length of pipe inserted in the lower bank of the feed ditch are cheap and fairly effective. Wooden flumes with auger holes about 1 inch in diameter spaced every 4 feet are quite effective, but the wood soon deteriorates and in time decays. The cement flume overcomes this objection, but both interfere with the free use of teams. For this and other reasons many orchardists prefer to conduct the water in a pipe and bring it to the surface through a short stand pipe located at the head of each row of trees. Each standpipe, through the small openings made in its shell slightly above the ground surface, can supply all the furrows belonging to any one row of trees without interfering to any appreciable extent with the free passage of teams.

The quantity of water applied to orchards during an irrigation season runs all the way from 1 to 5 feet. When more than 3 feet in depth is used it is pretty safe to conclude that the excess is wasted.

In districts of scanty rainfall and heavy evaporation, the most profitable crops are produced with the use of 20 to 30 inches in depth over the surface throughout the season. One of the most productive

apple orchards in the vicinity of Wenatchie, Wash., is irrigated five times between the middle of May and the last week in September, from 4 to 5 inches in depth being applied at each watering. In Southern California it requires fully 3 inches per month in depth over the surface, including both rain and ditch water, to keep citrus trees in good condition. For the past seven years the amount of irrigation water which has been applied to the lands under a canal at Riverside, Cal., which serves about 9,000 acres, has averaged $27\frac{1}{2}$ inches in depth over the surface. The average rainfall of this locality for the seven years was $10\frac{1}{2}$ inches, thus making the total $38\frac{1}{2}$ inches or a trifle more than 3 inches per month. In the introductory paragraph of this article it was estimated that the water now diverted from stream channels and other sources in excess of that required to produce satisfactory yields is sufficient to irrigate 7,000,000 acres of land. Very little of this excessive use is deliberate waste. A large part of the water taken from natural streams is lost before it reaches the fields of the farmers, and another large part of it results from the failure of the adapt methods of soil and crop conditions and to the character of the water supply in deciding upon the best method for given conditions. All these factors must be considered and the crop should be examined often to see whether the water is being properly distributed to the roots of the plant.

Strawberry Culture.

By W. T. MACOUN,

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OWING to the comparatively short time from the sowing of the seed until the plants bear fruit, the growing of seedling strawberries is one of the most interesting lines of experimental work in fruit culture. If the seeds are sown immediately after ripening they will germinate in four or five weeks if the soil is kept moist, and the plants from them will fruit the next season, if the conditions for growth the first summer are favourable. These conditions may be obtained by growing the plants in cold frames where they can be protected in late autumn and have a longer season for growth. If seed is not sown the same season as planting, it should be held over until spring, mixed with sand or in envelopes. The seed should be sown quite shallow, not more than a quarter of an inch in depth, in well-prepared soil. When the plants are large enough, they should be

pricked out about six inches apart, where they will remain until the spring following the planting of the seed. They should then be set out in the open about three feet apart each way. If the plants are grown on a large scale, it may be more practicable to transplant the seedlings directly from the seed-row to the field. No runners should be allowed to form the year the plants are put out in a cold frame. Before a variety is distributed, it should be fruited at least three years, as often the promise of the first season is not borne out the next year. As no two seeds from a cultivated variety are likely to produce strawberries exactly alike, one may have five hundred different varieties from five hundred seedlings of one named sort. As a rule, the proportion of varieties which are as good or better than the best on the market is very small.

PROPAGATING STRAWBERRIES FROM RUNNERS.

The usual method of propagating strawberries is from runners. It is by means of these that the natural increase of a variety takes place. As the first runners which have made root soonest, and hence usually make the strongest plants, these are the best to use in making a new plantation. There has been much discussion during recent years regarding the merits of the so-called "pedigree" plants which have been offered for sale by an American firm, they having claimed that, through years of selection, they had developed a much better strain of certain varieties than those who had not followed this system. In the first place the term "pedigree" has apparently been improperly used by this firm, as, to have a pedigree the ancestors of a plant or animal must be known, new blood being introduced in each generation through raising a new variety from the seed. A good pedigree is very desirable, both in plants and animals, but, up to the present time, the pedigree of plants for several generations is not often known. In the case of the "pedigree" strawberry plants it is said there has been a selection of plants under favourable conditions of growth, not an introducing of new blood. Plants which have been selected from the best plants year after year and grown under the most favourable conditions should show some improvement over those not selected, but the claims of superiority of the so-called "pedigree" plants have not been borne out by the results obtained here. In 1903 there were five of these "pedigree" varieties procured and compared with varieties of the same name, which had not been specially selected. These were fruited for two years, but while in some cases the "pedigree" plants yielded better than the others, they did not always do so. While the results obtained do not warrant the purchase of "pedigree" plants rather than others where there is no special claim as to selection, we believe that the principle of selection is good, and if thoroughly carried out is bound to result in an improved strain, which, however, can only be maintained by continued selection.

"EVERBEARING" STRAWBERRIES.

During the past twelve or fifteen years there has been much interest shown in the so-called "Everbearing" strawberries. These are varieties which, in some localities, will continue to bloom and ripen fruit during the summer and autumn long after other kinds have stopped bearing. This everbearing habit is considered by some botanists to be due to the transformation of the runners of these varieties into flower-bearing stems, the overbearing sorts making few runners. The wild Wood strawberry and its variety, the Alpine, have long been known to fruit more or less all through the summer and autumn, and for this reason they and several cultivated varieties of them are often called the Strawberries of Four Seasons. These all bear small fruit, hence they have little commercial value at present. In 1890 the Oregon Everbearing strawberry was exhibited at the Portland Exhibition and attracted much attention, being of good size. Whatever its everbearing habits may have been in Oregon, it proved very disappointing in this respect when brought to the Eastern and Middle States and to Canada. It was introduced into France about 1893 or 1894, and was highly thought of there for some time, as its everbearing habit was quite pronounced.

In 1893, the St. Joseph strawberry was introduced into France, and its introduction marked a new epoch in the history of Everbearing strawberries. This variety was the result of thirteen years' work by the Abbe Thivolet, Clanoves, France, who began in 1880 by crossing the Alpine strawberry with a large-fruited variety, the latter being the female parent. From this cross is supposed to have sprung the St. Joseph, through many generations and selections. In it there is no evidence of Alpine blood. While the St. Joseph strawberry was much larger than the Alpines, which up to its advent were the only cultivated strawberries which showed the everbearing habit regularly, they were small compared with some of the best large-fruited sorts. The Oregon Everbearing was reported in the *Revue Horticole*, France, in 1897, as being much superior to the St. Joseph in point of size, and it was thought would supersede that variety, but did not do so. Seedlings have been raised from the St. Joseph; the St. Antoine de Padoue, one of the best of them, is said to be a marked improvement on the former, bearing more fruit of excellent quality. The Oregon Everbearing strawberry was planted at the Central Experimental Farm in 1895 and the St. Joseph in 1899, but neither of these varieties produced enough fruit after the regular strawberry season was over to make them worth cultivating. It is evident that success with this class of strawberries is largely a matter of climate. After very dry weather when the fruiting season is over—weather which is not favourable to the production of runners—there will often be stalks thrown up when there is a change to warm, damp weather, which if continued will ripen fruit.

These conditions influence some varieties more than others. One season this peculiarity will be strongly marked, while the next it may not be noticed at all. The plants of these varieties may sometimes be made to fruit in late summer and fall by removing all the first blossoms. The Pan American, a variety originated in 1898, with Samuel Cooper, of New York State, yields very well to this treatment under some conditions. The Louis Gauthier is another variety which sometimes bears in the autumn.

POLLINATION AND CHARACTER OF THE FLOWERS.

It occasionally happens that a person who has a variety of strawberry which yields much better with him than other varieties which he has growing alongside, concludes to discard all his other kinds and grow that one variety. He does so and is disappointed to find that he has very few berries, and these ill-shaped and worthless. He does not know what to think about it, but writes to the Experimental Farm to learn what is the matter. The reply is sent back: "Are you aware that the flowers of strawberries may be perfect or imperfect, or bisexual and pistillate; in other words, do you know that some varieties of strawberries produce blossoms which have both male and female organs, while other varieties have only female organs? If you do not, the solution of your difficulty is very easy."

The male and female organs in plants perform the same functions as in animals. The fine dust formed on the stamens, which is shed when the flower is in bloom, is the fertilising agent, which falls on the pistil and fertilisation takes place. If the stamens are absent, or nearly all absent, as is the case in imperfect or pistillate flowers, no fruit, or very little fruit, is formed. If a perfect, or bisexual flowering variety and an imperfect flowering variety are growing in close proximity, the flowers on both will be fertilised as insects and winds carry the pollen or dust from the perfect to the imperfect. It very often happens that imperfect-flowering varieties produce the best crops when properly pollinated, and this experience may lead fruit-growers who are ignorant of the foregoing fact to make the mistake of planting only one variety, which may be imperfect.

A row of a perfect flowering sort should be planted to about every two to four rows of an imperfect variety, to have good results. The proportion will depend on the amount of pollen produced by the perfect sort. Of course, it is not necessary to plant an imperfect variety at all, as there are plenty of good sorts which have perfect flowers. It is essential to have the perfect and imperfect varieties in full bloom at the same time, as, if the former bloomed before the latter, there would be no object in planting it as a pollinator.

Several terms have been used to express perfect and imperfect flowers, such as Hermaphrodite and Pistillate; Staminate and Pistillate; Bisexual and Pistillate; but most persons now use the terms Perfect and Imperfect as the least confusing and the most expressive. The contractions of these words used in this bulletin are "Per." and "Imp."

THE SOIL AND ITS PREPARATION.

If possible, the site for the strawberry plantation should be chosen where snow will lie in winter. A good covering of snow usually ensures a good crop of fruit. One of the most important requisites in a soil for strawberries is thorough drainage, as where water lies on or near the surface, the plants are sure to suffer either in summer or winter. While too much moisture is bad, too little moisture is unfavourable to the development of fruit, hence a soil should be retentive of moisture while not saturated with it. Warm soils, such as sandy loams, will produce early fruit, but friable clay loam will usually produce the best crops. Much, however, depends on the richness of the soil, as strawberries need an abundance of available plant-food to give the best results.

Soil which will grow good crops of roots will usually grow good strawberries. A soil should be chosen, if possible, which does not bake naturally or which by thorough tillage may be brought into such good condition that it will not bake. It is difficult to keep the plantation free of weeds in soil that bakes, and it is also hard to conserve soil-moisture in a dry time.

Soil should be chosen, if possible, that has been prepared in a measure, by growing a crop of roots which have been heavily manured. After the roots or other crops have been removed in the autumn, the land should be stirred deeply, it being a good practice to use a subsoil plough after the ordinary kind for this purpose. By using the subsoil plough the soil may be loosened to the required depth without bringing the subsoil to the surface, which would probably happen if it were ploughed very deep with the ordinary plough. Clover sod ploughed in the autumn is also good, as the sod furnishes humus, but grass-sod land should be avoided as there is great danger of injury from the white grub. In the spring the soil should be brought into good tilth with the harrows and when it is thought best it may be ploughed beforehand.

FERTILISERS.

The best fertiliser for strawberries is well-rotted barnyard manure, which should be used in large quantities. There need be little fear of using too much—thirty tons of well-rotted manure per acre being a fair application. It may be applied early in the spring before planting and thoroughly incorporated with the soil, or it may be used for a previous cultivated crop so as to get the soil clean and in the best condition for the strawberry plants. Fresh manure is not as satisfactory as rotted, for

it may make the soil too loose, causing it to dry out quicker and make the conditions bad for newly-set plants. On heavy soils, fresh manure may be used with better results than on lighter soils, but as there are likely to be many weeds grow if green manure is used, rotted manure is preferable even on heavier soils. If fresh manure is used it will be better mixed with the soil by planting time, if it is applied in the previous autumn. Wood ashes are very useful for a top-dressing, and from 50 to 100 bushels per acre may be applied broadcasted early in the spring when the land is being harrowed, the larger quantity being used for land which is poor in potash. An application of even twenty-five bushels per acre should give beneficial results. If barnyard manure cannot be obtained easily, nitrogen and humus may be added to the soil by ploughing under clover, peas or some other leguminous crop; potash, by using from 200 to 300 pounds per acre of muriate of potash, if wood ashes cannot be obtained; phosphoric acid, by the use of ground bone, at the rate of from 200 to 300 pounds per acre before planting. Nitrate of soda is also useful for furnishing nitrogen unless it can be obtained in a cheaper form, by the use of barnyard manure or leguminous crops. An application of 100 to 150 pounds nitrate of soda broadcasted just before the flowers open in the spring, is sometimes desirable if the plants are not making vigorous growth.

PLANTS AND THEIR TREATMENT.

If the plants for setting out are obtained from a distance, they should be ordered to arrive as early in the spring as possible after the soil can be worked, and planted soon after arrival. It is often, however, not convenient to plant at once; but in any case, the parcel containing the plants should be opened up when it arrives, otherwise they are liable to heat or dry out, either one of which conditions should be avoided if possible. The plants should now be heeled in in some place where the soil is well drained. Open a trench sufficiently deep to cover the roots of the strawberries well and so that the crown will be just above ground. Now place the plants close together, but in a single row in the trench. Another trench is now opened parallel with the first and about six inches from it, using the soil to cover the roots of the plants in the first trench. This soil should be firmly packed or tramped against the roots so that the moisture will come into close contact with them. If loosely heeled in, they are very likely to dry out and the plants die. Other trenches should be dug parallel with the first two, if needed. By the time the field is ready for planting, these heeled-in plants will have made new roots and be in better condition for planting than if they had been set out at once. The best plants for autumn planting are what are known as "pot" plants. These are obtained by sinking two and one-half inch pots filled with rich friable soil in the ground and placing a new

runner in each of them. These root and make good plants by late summer. The advantage they have over plants rooted in the ordinary way is that when they are transplanted they are taken from the pot and re-planted with a ball of earth without disturbing the roots. Hence they are but little checked and will soon go on growing again, making stronger plants, which will bear more fruit than the ordinary ones.

Before planting, it is a good plan to remove all the large leaves of the plants except about two of the healthiest ones. This prevents too rapid transpiration of moisture from the plant before it becomes established and may often save it when dry weather sets in immediately after planting. Long and straggling roots may also be cut off at this time, the removal of about one-third of the roots being a good practice. When possible, one's own plants should be used as they are much more likely to live than those procured from a distance, as the former can be dug and planted within a few hours while still fresh. The best plants to use are the strongest of those which have been made the previous year. Plants which have already fruited should not be used as they are much more difficult to transplant and their vitality has been weakened by the production of runners. It is a good practice, if it can be managed, to grow plants for setting in a special propagating bed, the old plants in which, not being allowed to fruit, make stronger runners and plants than do the fruiting-plants. Furthermore, the extra attention to the cultivation of the soil and to the placing of the runners in such a bed will ensure good plants.

PLANTING.

Successful planting may be done either in the spring or autumn. Early in the spring, however, is the most satisfactory time, as, if the plants are set then, when the soil is in good condition and cool and moist, they will make rapid growth and many runners during the summer, if properly looked after, and produce a full crop of fruit the following season. If planted in the autumn, there will, as a rule, only be a light crop of fruit the following season, and unless the weather is favourable and the soil is moist when the plants are set, there may be little growth. If planting is done in the late summer or autumn it should be as soon as the plants can be obtained with sufficient roots and when the soil is moist. The most satisfactory way for the average person in Eastern Canada to grow strawberries is in what is known as the matted row. The plants are set from fifteen to eighteen inches, or even more, apart in rows three and one-half to four feet apart. The varieties which make a large number of runners, such as Warfield, Senator Dunlap, and Splendid, need not be planted as closely as those which make fewer runners, such as Bubach, Buster, Glen Mary, and Williams. If the plants are set early in the spring and have a long season for growth, the varieties

which make a large number of runners may be planted twenty-four inches apart in the rows, thus admitting of cultivation both ways for a time, thereby reducing the number of weeds and ensuring better growth. As soon as the distances have been decided upon, the rows may be marked with a marker and then again cross-marked so that plants may be set where the lines intersect. Long rows are desirable as, with them, time will be saved in cultivation. Planting may be done either with a spade or with a trowel or dibble. When planted with a spade, two persons are required for the work, usually a man and a boy. The man takes the spade and opens the hole by forcing the spade into the ground, pressing it forward and backward. As soon as it is withdrawn, the boy places a plant in position and the man presses the soil firmly against it with his foot. This method is very rapid and, if the soil is well pressed against the plant, is quite successful. A surer method of obtaining a perfect stand is by using a trowel or dibble for opening the hole, whereby the plant is more likely to be set the proper depth, and more care is usually exercised in spreading the roots and firming the soil about the plants. By this method, one person both opens the hole and sets the plant. Great care should be taken to have the crown of the plant just at the surface of the ground after it has been pressed in when planted. If it is too high the crown will dry out, and if too low it will be smothered. Care should also be taken when planting to spread the roots against the sides of the hole. Planting machines are used by some growers and give good satisfaction when the work is well done and the season favourable. If both perfect and imperfect varieties are planted there should be about one row of perfect to two to four of imperfect, as previously stated.

CULTIVATION.

As the value of the future crop will depend largely on the strength of the runners and new plants which are formed during the early part of the summer, it is very important to encourage rapid growth from the outset. Cultivation should begin as soon as possible after the plants are set, and the surface soil should be kept quite loose and free from weeds until the cultivator interferes with the runners. The early cultivations should be deep in order to loosen the soil in which the roots are to grow, and to warm and aerate it, making conditions for growth of fruit as favourable as possible, but as soon as there is danger of injuring the roots of the plants, cultivation should be shallow. Hoeing will be necessary occasionally in order to destroy all weeds and loosen the soil close to the plants. All blossoms which appear during the first season should be pinched off so as to reserve the strength of the plants for the production of runners. Most varieties make far more runners than should be allowed to remain, and, if one is making a speciality of strawberries or wishes to get the finest berries, the best plan is to place the runners so

that they will root more quickly, and to destroy all those which are not required in following the system which it has been decided to adopt. In the prairie provinces, where winds prevent the prompt rooting of runners, it is important to hold them in place until they root with stones, pieces of sod, an inverted crotch, or by any other suitable method.

FORMING THE MATTED ROW.

The best way to grow strawberries for general culture in Ontario and Quebec is in the matted row. By this method, labour is economised and the results, while sometimes not as good as where special methods are adopted, are obtained with the least expense and the greatest profit. Where a special market is to be catered for and when desired for home use, strawberries may be grown by other methods which will result in larger and finer fruit. While many who grow strawberries in the matted row do not take the trouble to place the runners as they form, it pays to do so, as the sooner they take root, the stronger the plants will be by autumn and the more fruit will be produced the next season. All that is necessary is to place the runners so that they will be as nearly uniformly distributed as possible in order to economise space, and to put a little soil over them to hold them in place, at the same time leaving the terminal bud bare. When treated in this way they will root quickly. To get the best results, runners should not be nearer than from 4 to 6 inches apart, all others being destroyed; but in practice it is often difficult to accomplish this and restrict them to this area, as some varieties make a great many runners. These are, however, the kinds which have most need of thinning, as, when the plants are very thick, the fruit is too small. The width of the row formed by autumn will depend on the number of runners which are made, but, if planted early and properly cared for, most varieties will make a row two feet wide. At this width, there would be a path 18 inches wide left for the pickers between the rows. As some varieties would cover the whole space between the rows with runners in one season, it is necessary to remove those not wanted with the cultivator or hoe.

SINGLE AND DOUBLE HEDGE ROW SYSTEMS.

The so-called single hedge and double hedge row systems are merely modifications of the matted row. The runners, instead of being allowed to form indiscriminately, are most of them removed and the rest placed where it is desired to have them grow. In the single hedge row system, two to four runners are left on and these are placed in line with the row on each side of the parent plant. When grown in this way the rows are two and one-half to three feet apart and the original plants about two feet or more apart in the rows. When the row is formed, the plants are six to eight inches apart in a single row.

In the double hedge row system, six runners are left to each plant,

one on each side of the plant in the row and two on each side of the original row, all about equal distances apart. Trained in this way, the original rows should be about three feet apart and the plants two feet or more apart in the rows.

The "twin" hedge row system provides for two rows 16 to 18 inches apart with the plants at first about two feet apart in the rows, with a wider space of two feet for a path and for cultivation between each pair of rows. The new plants are placed six to eight inches apart between the pair of rows. The hedge row systems require considerably more labour than the matted row, but the returns will often well repay the grower for the extra amount of work. By this method the plants get more opportunity of developing strong crowns, better cultivation can be given and more of the plant food in the soil will be available, resulting in larger and better fruit.

HILL SYSTEM.

Large berries may be obtained by growing the plants by what is known as the "Hill System." The plants are set from 12 to 15 inches apart, in rows two to two and one-half feet apart; the blossoms are pinched off the first season as in the other system and no runners are allowed to form. By this method a very strong crown is developed; the plants, having more room, become very vigorous, and, as a result, the fruit is large and sometimes as good crops are obtained as from the matted row. However, winter injury is much more likely to occur when plants are grown individually, and if plants grown in hills die from heaving or from some other form of winter-killing they leave large blanks, causing a great lessening of the crop. Unless kept well cultivated or well mulched in summer, plants suffer more in a dry time in hills than in the matted row where the crowns are better protected by foliage. If the plants are kept well mulched, very fine fruit is produced when strawberries are grown in hills, which makes this method sometimes preferable when growing strawberries for home use.

WINTER PROTECTION.

After permanent frost has set in and the ground is quite solid, the plants should be covered with a light coat of clean straw, that which will not pack closely over the plants being the best, marsh hay being very good and free from weed seeds. This mulch will prevent the alternate thawing and freezing of the ground in the spring and protect the plants if there is not much snow in winter. A heavy mulch may cause heating in the spring before it is removed, and as a light mulch of two or three inches is sufficient, more should not be used. It has been occasionally recommended to grow something between the rows of strawberries during the latter part of summer, which could be used to hold the snow in the winter, but this is not a desirable method as, while growing, it ex-

hausts the moisture from the soil at the expense of the strawberry plants. While plants will often come through the winter without protection, it is best not to take any risks. After the frosty weather of early spring is over and before the plants begin to grow, they should be uncovered and the straw put between the rows to keep the fruit clean. If the soil is one which bakes or dries out easily, it is a good plan to remove the mulch, cultivate, and put it back between the rows when conditions will be better for conserving moisture. As soon as the fruit has been picked, the straw should be removed altogether, the plantation ploughed up, or, if left for another season, it should be weeded and the surface soil loosened with the cultivator so that the new runners may have a chance to root.

RENEWING THE PLANTATION.

The most satisfactory results are obtained when only one full crop is gathered from a plantation. If, for instance, plants are set this spring, the plantation should be ploughed up after the fruiting season of the next year. There will thus be a new plantation made every year. By this system, much better fruit is obtained as the plants are not so thick in the row and the soil can be kept much freer of weeds. Where the white grub is troublesome, it is very important to renew the plantation every year, as this pest increases rapidly in old plantations and sometimes almost ruins the crop. It is quite possible to obtain two good crops or even more, from a plantation by careful management, but the older the plantation, the less the crop will be and the smaller the fruit, as a rule.

RENOVATING AN OLD BED.

While as a rule the most profitable method of growing strawberries is to take only one crop from a plantation, and at the most two crops, it is sometimes not practicable to renew small plantations after the second crop. Under such circumstances, there are several ways in which the bed may be improved. Usually an old bed is grown up with grass and weeds and crowded with strawberry plants, and to improve the bed, these must be reduced as much as possible. As soon as the fruit is off, the leaves and grass should be mown off and burned. One plan is to plough or dig down the middle of the row, then thoroughly cultivate or rake. Another method is to narrow the row on each side to a width of 8 to 12 inches, turning the sod towards the row. Still a third plan is to plough lengthwise through the centre of the row, then cross-plough. It is necessary in following any of these methods to level the soil afterwards with the harrow, cultivator or hoe. Usually the work is finished with the hoe by cutting out all surplus plants and bringing the soil about those remaining, which will give them better conditions for making roots. It should be remembered, when renovating the bed, that it is not necessary to leave

many plants. Plants left sixteen to twenty inches apart should make a good row by autumn. Those left should be the youngest and strongest. It is a good plan when renewing to work in some short rotted manure to improve the soil.

IRRIGATION.

During the fruiting season the strawberry needs a large supply of moisture to give maximum crops. In some seasons, owing to dry weather, the crop is reduced very much, the season is shortened and the profits are small. If, under those conditions, there were available a supplementary supply of water which could be used for irrigating, a marked improvement in the crop would be ensured in many cases. Where men are growing plants for sale, more runners will be made and the plants will be stronger if an abundant supply of water during the growing season is available.

VARIETIES.

Owing to the ease with which a new variety of strawberry is originated, and the short time it takes to fruit the same, the number of new sorts each year in America is very large. Only a small proportion of those which are produced are better than, or even equal to, the best which are already on the market, but often the originator is not the most competent person to judge of the relative value of his seedling, and as a result many new sorts are offered for sale every year. It is the work of the Experimental Farm to test these new varieties as they appear, and, having compared them with standard sorts, publish, when deemed advisable, a reliable description of them and the yield obtained. During the past twenty-one years, 596 named varieties have been tested at the Central Experimental Farm. Of this number only fourteen are still under test of those grown during the first two years. This does not mean that nearly all the varieties tested at first have deteriorated, but that better kinds have been introduced and have taken their places. It is interesting, however, to note that of eleven varieties which were considered very promising twenty years ago, three are still among the most promising under test, namely, the Bubach, Warfield, and Daisy. The Daniel Boone is another variety of the Warfield type which continues to do well, though under test for twenty-one years. Williams has been tested for eighteen years and is still one of the best commercial berries for long-distance shipment.

It should be stated here that all the tests with varieties have been made on sandy loam soil. On clay loam the results might have been different, but this soil was not available.

The ideal variety of strawberry has yet to be found, but, as an aid to those who are originating new kinds, the following description of an imaginary variety approaching perfection is herewith given:

DESCRIPTION OF AN IDEAL VARIETY OF STRAWBERRY.

Perfect.—Plant hardy, very productive; vigorous, making a moderate number of runners; should succeed well on a great variety of soil; must withstand drought well. Foliage large, abundant; rust-resistant. Flowers borne on stiff stalks of sufficient length to keep the fruit well off the ground; pollen abundant. Fruit: Size, large to very large from beginning to end of picking season; form, roundish conical with a slight but not prominent neck; regular; calyx or hull small; seeds not prominent; colour of uniform lively, deep glossy red from tip to stem; not showing scald readily; flesh firm, red, juicy with a tender core; subacid, sprightly, with a pleasant high flavour. Season, very early to very late, or, in other words, all summer.

A berry of the foregoing description is not an impossible one to realise, and if those having strawberries to introduce would have the ideal strawberry more in mind, there might not be so many inferior sorts introduced every year.

As the ideal strawberry has not yet been found, until this ideal appears, it is necessary to plant several kinds, each having its own good points, so that one may have the greatest quantity of fruit of good size, appearance and quality from the beginning to the end of the season.

In order to furnish information regarding the best varieties for certain purposes, separate lists are published in addition to the general list.

VARIETIES OF STRAWBERRIES RECOMMENDED.

There are so many varieties of named strawberries introduced each year that the list of those recommended has to be changed from time to time, as those of superior merit are found.

The following are those which are recommended at the present time:

Commercial.—Beder Wood (per.), Splendid (per.), Warfield (imp.), not suited to light soil, Williams (per.), Greenville (imp.), Bisel (imp.), Sample (imp.), Buster (imp.), Pocomoke and Parson's Beauty are also two very good commercial berries.

Domestic.—Excelsior (per.), Splendid (per.), Senator Dunlap (per.), Lovett (per.), Ruby (per.), Bubach (imp.), Wm. Belt (per.).

VARIETIES HAVING THE LARGEST FRUIT.

The amateur grower likes to have varieties which produce the largest fruit, and the man who sells fruit to special customers also prefers the largest, if they are suitable in other respects. As twenty-five average berries of each kind are weighed from year to year at the second picking, it is possible to give the following list of the twelve varieties giving the largest fruit. The average weight is for five years, unless otherwise specified:

Variety.	Flower.	Average Weight for 5 years of 25 Average Sized Berries.	
		ozs.	
Maximus	per.	8	5-6
Enormous	imp.	8	1-12
Bubach	imp.	7	11-12
Gladstone	per.	7	3-4
Glen Mary	per.	7	7-12
Carrie	imp.	7	7-12
Ridgeway	per.	7	5-12
Brandywine	per.	7	5-12
Sample	imp.	7	1-3
Buster	imp.	7	1-6
Clyde	per.	7	1-6
Hood River	per.	7	1-6

Some newer varieties have also produced large fruit. The following is the average for two years:

Big Bobs, 8 ozs.; Joe, 8 ozs.; Armstrong, 7 7-8 ozs.; Yant, 7 3-8 ozs.; Uncle Jinn, 7 3-8 ozs. Other varieties producing very large fruit are New Globe and Gibson.

VARIETIES HAVING THE MOST ATTRACTIVE FRUIT.

An attractive berry is very desirable, especially in mid-season when there is the greatest competition. A berry to be attractive should be of good size, regular in shape, and of a lively but rather deep scarlet or crimson, with a glossy surface. It has been found by experience that the light scarlet berries do not sell so well as the darker shades, if the latter colour is not dull. The seeds should not be too prominent, but should not be much sunken. The following are considered the most attractive of those grown at the Central Experimental Farm:

Most Attractive.—Anna Forest, Anna Kennedy, Barton's Eclipse, Bisel, Bomba, Bubach, Daisy, Daniel Boone, Eleanor, Hood River, Irene, Joe, Kittie Rice, Lloyd's Favorite, Logan, Lovett, Marie, No Name, Parson's Beauty, Ridgeway, Sample, Satisfaction, Senator Dunlap, Sherman, Snowball, Steven's Early, Tennessee Prolific, Van Deman, Warfield, Winnie Warfield.

VARIETIES HAVING THE BEST QUALITY.

Varieties having the best quality means, in this instance, those which have the agreeable characteristics of the strawberry developed in the highest degree. As tastes differ considerably, that which is considered best in quality by one is not thought highly of by another, but it is believed that this list will include most of those which would be considered best generally:

Best in Quality.—Beverly, Big Bobs, Gibson, Granville, Ham, Jucunda Improved, Kittie Rice, Luxury, Marshall, Nich Ohmer, Pennell, Ruby, Scarlet Ball, Snowball, Uncle Jim, Wm. Belt, Wonder, Yant.

Unfortunately, some of those which are best in quality are inferior in productiveness, hence many varieties of fine quality have been discarded, among these being Brunette, Cameronian, and Timbrell, three of the finest flavoured varieties.

BEST VARIETIES FOR PRESERVING.

The darker-fleshed varieties usually make the best looking preserves and are, as a rule, the most suitable for this purpose. Of the varieties recommended in the general list the best are Senator Dunlap, Warfield, Splendid, Lovett, and Ruby.

VARIETIES WITHSTANDING DROUGHT BEST.

During the strawberry season of 1908, there was one of the severest droughts ever experienced at the Central Experimental Farm. The foliage of most varieties wilted down and many leaves dried up, but some kinds showed much greater ability to withstand the drought than others. This is no doubt due, in some cases, to the ability of the foliage to withstand the hot, dry air, and in others to a better and deeper root system. Some varieties, doubtless, had both resistant foliage and good roots. Most of those which withstood the drought best were medium to late in season, though it should be stated that in this case the early sorts have not been considered, as their fruiting season was almost over before the drought affected the crop severely. Following are the varieties in alphabetical order:

Armstrong, Barton's Eclipse, Beidler, Big Bobs, Brandywine, Buster, Commonwealth, Clyde, Daniel Boone, Dora, E. H. Ekey, Gandy, Giant, Gibson, Glen Mary, Governor Rollins, Great Ruby, Greenville, Hatch Experiment Station, Hood River, Hero, Joe, Luxury, Miller, Mrs. Cleveland, Mrs. Fisher, Mrs. Miller, Murray, Nettie, New Dominion, New Globe, Parson's Beauty, Pennell, Pocomoke, Ridgeway, Robbie, Ruby, Scarlet Ball, Seedling from C. H. Smith, Yarmouth, N. S., Steven's Late Champion, Sunnyside, Tennessee Prolific, Uncle Jim, Williams.

CAUSES OF POORLY-SHAPED BERRIES.

There are two causes of poorly-shaped berries or nubbins. The commonest is unfavourable weather conditions. The flower and growing fruit of the strawberry are very susceptible to injury from cold winds or cold weather. Sometimes part of the berry is injured while another part, being perhaps more protected, escapes and develops as normally as it can with part of the berry injured. Another cause of poorly-shaped fruit is lack of proper pollination. The supply of pollen is either deficient in the fruit itself, or there has not been enough brought by wind and insects to pollenize all the stigmas of the berry. Extremely dry, hot weather may injure the pollen. Rainy weather during the blossoming season may cause much poorly-shaped fruit by preventing proper pollination. The remedy is to plant varieties with abundant pollen and mix these with any imperfect sorts which may be grown. Keeping the plants back as much as possible in the spring by not removing the mulch early will help to avoid injury from cold winds and frost.

The Growing and Preparation of Wool for the South African Market.

By JAS. J. MCCALL,
*Government Wool Expert, Cedara.**

THE object of this article is to place before wool growers, in as concise a form as possible, the most important points in connection with the wool industry, in so far as it affects the producer. Naturally the first object of consideration must be the sheep, as it is on the breeding, constitution, condition, environment, treatment and age of the animal, that the value of its wool depends. That wool from a well-bred sheep is of far greater value than that from an inferior or mongrel animal is generally admitted, and the good sheep requires no more feed or attention than the mongrel; so that it is self-evident that it is bad policy to keep the latter animal on the farm. Just as important as good breeding, is good constitution, and this is the one sure foundation on which to build a superior flock. It is far easier to breed good wool on to a flock with sound constitutions, by up-grading, than to breed sheep with good constitutions from weakly progenitors; in fact it is courting failure to attempt to do so. The condition of the flock ought to be the farmer's constant care. No matter how poor a sheep may be, it will still grow wool of a sort, but to obtain the best results the animal should always be kept in good condition, not necessarily fat, because that only affects the growth and condition of the wool up to a certain point. When that point is reached, the additional nourishment goes to form fat or flesh, and unless the farmer desires to lay up a reserve of condition in his flock, or to fatten for market, this ultra condition is quite unnecessary.

The sheep is a most susceptible animal and the wool-covering reflects this trait in a very marked degree. If the animal be subjected to extremes of heat or cold, semi-starvation, excessive thirst, sickness, over-driving, or any other abnormal circumstance, the wool will always show the effects either by a tenderness or by a decided break, coinciding with the period of growth at which the interruption occurred. When wool has suffered in this way its value is reduced by at least one-third. Sickness may not always be preventible, but the flockmaster can provide

* This Article has been written by Mr. McCall for a booklet, which Messrs. Reid & Acutt's Wool Mart Ltd. (Durban), are bringing out; we are indebted to Mr. Green, the Managing Director, for an advance proof for publication in this *Journal*. This booklet will prove of great interest and value to sheep farmers in South Africa, and in our next article we intend in publishing a review of the same.—ED.

against any of the other causes of this ruinous result by care and foresight.

Environment is a subject that the farmer must study closely when laying the foundations of his flock. When one considers that it is the effects of climate and environment that are mainly responsible for the various breeds and types of sheep which now exist, we can appreciate how the Rambouillet was evolved from the fine Spanish Merino, and how the wrinkly Vermont was also bred from the same ancestors.

Undoubtedly, selection played an important part in these evolutions, but selection without suitable environment and climate would never accomplish such results. It is common knowledge that certain districts are only suitable for the breeding of fine wools, while others again are best adapted to produce strong wools. Two districts in Australia with which the writer is personally acquainted, give practical proof of this fact, *viz.*, Mudgee in N.S.W., and South Australia; the former grows some of the finest wool in the Commonwealth, the latter is famous for its robust wool. It may not be out of place to mention here that, as a rule, very fine wool and a large coarse carcass, is an anomaly; when it is otherwise, it is the rare exception which proves the rule. The treatment of the flock and the individuals composing it, is a subject which is of too comprehensive a nature to be dealt with in the present article, but the most salient points may be mentioned, *viz.*, dipping, dosing, feeding, sheltering and endeavouring to keep the sheep from hurtful seeds and vegetation which injure the wool, and lastly, but not least, the avoidance of dirt and dust as much as possible in the growing fleece. The final point we have to consider is the age of the sheep in so far as it concerns good wool.

When a sheep is two-toothed it is growing its best and most valuable fleece, and from that age onwards the fleeces will gradually become of less value as the seasons pass—both as regards quantity and quality, and more especially so in a breeding ewe—until a time arrives when it does not pay to keep the animal any longer as a wool producer. With few exceptions, it is good policy to discard sheep when they have obtained their full-mouth, and even earlier if possible. Of course, individual circumstances and expediency must be taken into consideration, but that does not affect the advisability of following the advice given, where practicable.

LAMBS.

To the inexperienced beginner in sheep-farming there is one fact to which I would draw his attention in breeding lambs. Lambs born from May to September, commonly called "winter lambs," have always more stamina and attain to a larger and more robust frame than "summer lambs." I speak from personal experience, and I think those farmers

who have bred both sorts will bear me out in my statement. There are many reasons for this, but the following I consider the most important. Ewes due to lamb in winter are, as a rule, built up and put into such good condition during the summer months, that they enter the winter with every prospect of emerging from its hardships with constitutions unimpaired. When the lambs are born, the mother has a sufficiency of milk to nourish the offspring, and this supply is kept up by a judicious addition of artificial food, say rape, kale, roots, rye-grass, etc., to the ordinary veld grass. This serves a three-fold purpose: the strength of the mother is kept up, the lamb is well nourished at the most important time of its life, and it is also taught to eat artificial food. When weaning time comes, the lambs are strong and hearty, and when weaned on to the young spring grass, their growth is not arrested, and the mothers have an opportunity during the summer months of recuperating from the effects of maternity. In breeding "summer lambs" the opposite results obtain and the lambs never attain to the stamina of their winter brethren and sisters. There is a truism in wool growing I would like to emphasise, "Semi-starvation of the sheep and successful wool growing can never be combined." Good-feeding is as important as good-breeding.

Having touched thus briefly on the growing of good wool, we can now consider the proper manner of shearing and preparing it for market, and in this connection I may state that when I write of a fleece or of the get up of wool, I refer only to the full year's growth or approximately so. I am one of those who hold very decided views about the custom of shearing twice a year, but as the matter is controversial I will not in this article give expression to any opinions on the subject.

In preparing wool for market the days are past when the judicious addition of a shovelful of sand meant extra profit, or the ingenious use of the garden watering-can on the sheep previous to their being shorn was sufficient to bleed the buyer of a few more pounds. If there is one business above all others in which it pays to be honest, it is in the wool growing industry, and it will be well for farmers to recognise this fact and act accordingly.

When sheep are about to be shorn precautions ought to be taken to obviate the dust nuisance at the shearing kraal or shed, by having a plentiful supply of water close at hand, and by frequently cleaning the catching pen. The shearing floor should have a smooth surface which can be swept clean, concrete or flooring-boards for preference, but where this is not practicable a tarpaulin well stretched out does fairly well. Never shear on ox hides with hair on: the hairs come out and get mixed up in the fleece, a circumstance which detracts considerably from its value. In the writer's experience in South Africa this is a common practice with many farmers, and one which cannot be too severely con-

demmed. The equipment of the shearing shed ought to include a bass-broom, a couple of baskets, a wool table, and if possible a wool press.

The broom is used almost continually on the floor. When a boy has shorn a sheep, the place where he worked should be swept clean before he commences on another, otherwise the dags and moits which are trimmed off the britch and points are picked up with the fleece, and are apt to be rolled up with it, unless exceptional care be taken at the wool-table. It is far preferable that all such clippings be swept together on the floor, and removed from time to time.

The baskets are kept on the shearing floor and the "belly wool" is thrown into one, and all the other trimmings into the other. When the baskets are filled they are emptied into separate wool bales (which are hung in some convenient place by the four corners) until sufficient has accumulated to make a complete bale of each lot.

HOW TO HOLD AND SHEAR A SHEEP.

After being caught the sheep is placed with its rump on the ground, between the shearer's knees, which are held slightly apart. The forefeet and head are then placed well up under the shearer's left arm, thus leaving the left hand free. The belly wool is first removed by shearing *with both blades under the wool* from the elbow to the point of the flank, then shearing with cross-blows to the other side of the belly, care meanwhile being taken not to cut the pizzle of Rams or the teats of Ewes. This belly wool is taken off and thrown aside. The shearer then proceeds to clean the crutch and the points. Having completed this, the position is now altered. The shearer places his right leg between the sheep's legs, pressing slightly on the brisket, the left leg pressing on its backbone. He then grasps the sheep's muzzle with his left hand, having the palm of the hand beneath the lower jaw. The sheep's head is then pressed back over the shearer's left thigh, bringing neck and muzzle into a straight line. He then proceeds to shear from the point of the right shoulder close to the brisket, *with both blades under the wool*, and shears right up to behind the sheep's right ear, then tears the wool out—not cutting it. This is called "opening up." The wool from head and neck is then shorn, gradually proceeding down the left side of the sheep until the tail is reached. During this time the forequarter of the sheep is gradually brought forward, leaving the rump still in the same position on the floor. This is accomplished by the shearer gradually moving back as he shears down the side. It will now be noticed that the sheep is lying flat on the floor. Whilst in this position the wool growing on the back-bone is shorn off from the tail to the neck. The shearer then stands over the sheep facing its head. He catches the right ear, or head, with his left hand and pulls the head and neck back on to the shoulder, and proceeds to *shear the sheep away from the wool*.

As he progresses along the right side, the sheep is gradually lifted into a perpendicular position, until the tail is reached. It will now be found that the sheep is sitting in his original position, on the same spot, whilst the fleece will be lying on the ground, unbroken, and in a suitable position for picking up.

PICKING UP A FLEECE FOR THROWING ON TO THE WOOL-TABLE.

If the sheep has been shorn and the wool taken off according to foregoing directions it will be found a simple matter to pick it up correctly; but if not, it is rather more difficult, but still possible. When the fleece has been taken off, it will be found lying with the white shorn side uppermost, but after it has been picked up and thrown on the wool-table, that side must be underneath, so that second cuts, fribs, etc., will fall through the spars of the table. When about to pick up a shorn fleece, the correct place to stand is at that part of the fleece representing the neck, with the toes underneath the wool, the picker-up then stoops forward and with both hands grasps those portions on each side of the britch, which ought to be opposite where he is standing. The wool is pulled slightly towards him, then smartly whipped back with a circular motion so as to fold the fleece backwards, giving a double fold; this renders that part strong enough to be gathered round on each side with a sweeping motion towards the right and left foot, when the whole fleece is pinched up together. In this form it is carried to the end of the wool-table and held up as perpendicularly as possible. In throwing, the bunch of fleece is brought in towards the breast of the thrower, then thrown smartly out, aiming at the other end of the table. When the arms are almost extended in the act of throwing, the hands are moved smartly apart, *but still grasping the britch of the fleece*. This releases the part that was resting on the toes in picking up *viz.* the neck; naturally this part flies outwards, and the act now is similar to that of the house-wife laying a table-cloth on the table; the two hands are held further apart and gradually lowered, as the fleece sinks on to the wool-table, completely spread out with the clean side underneath. The process is very simple, and may be taught to anyone in about half-an-hour by any expert thrower.

TO SKIRT A FLEECE.

In this operation no hard and fast rules can be laid down, as to what should be taken from or left on the fleece. Individual knowledge, judgment, and expediency are all important factors in skirting fleeces, but a few main considerations may be mentioned. In skirting, commence at the neck; in this country where the flocks are comparatively small, unless this portion is very seedy or burry it is not advisable to take anything off. Passing on, we may just pick off a few fribs or second cuts from the point of the shoulder, but as little from here as possible;

on reaching the forearm there is usually something to be taken off, either on account of coarseness, seediness, or wastiness, but do not go too deep. Along the edge of the body there should be little to come off—if the belly wool has all been removed—merely a few pickings here and there, until the thigh is reached. It is here and round the britch that the skirting will have to be deeper, so as to take off all coarse, rough wool and all which may be stained by excreta or urine. When both sides of the fleece have been overhauled in this manner, it is advisable to notice the state of the wool down the middle of the back; if it looks like a lot of dirty cobwebs, run the hand (open fingers downwards, comb fashion) down the whole length of the fleece, and comb it off, throwing it under the table. If a prospective buyer finds a lot of mushy, wasty, dirty wool amongst the fleeces, well—he is going to protect himself at the seller's expense. It pays to be thorough as a few negligent slips may damn what may be really a good clip.

TO ROLL A FLEECE.

Standing on one side of the table, the wool-roller folds over the edge near him for about three or four inches, sufficient to show a nice clean selvedge right along the whole side. Then he leans over the table and grasps the other edge of the fleece, and lifts it towards him, placing this edge touching the edge he previously turned over. Leaning over again, he grasps the folded edge on the far side, and again lifts it towards him, until the two folded edges are exactly one above the other. It will now be noticed that the middle of the back of the fleece is lying down the middle of the folded fleece, and unless this result is obtained, the fleece is improperly folded.

In rolling, start at the neck and roll on to the shoulder wool; place the left elbow on the roll to hold it in position, and roll inwards from the britch until the two rolls meet, pass one roll over the other to tighten them, then pick the rolled fleece up with both hands.

It is not at all necessary to tie fleeces. When the tying is done with a portion of the fleece, it means that part of the fleece is being torn and twisted after so much care has been taken to keep it intact. When an untied rolled fleece is placed in a stack, or in a bale, it will be found that when the animal heat has left the wool, each individual rolled fleece may be handled without becoming unrolled, if not used too roughly.

Never tie fleeces with string; this practice is severely condemned by manufacturers.

CLASSING THE FLEECES.

From practical experience obtained in South Africa, I am of opinion that intense classing does not pay, the primary reason being that at present the average clip is not large enough to allow of a fine discrimination in qualities. To begin with, it may be taken that the

object of a classer handling an average South African clip should be to send to market the fewest possible classes, provided that the several lots are of even quality throughout. The first class should consist of all fully grown, sound fleeces, provided there is no very great variation in length, and only when absolutely necessary should extra sorts of fleeces be made, such as "Super Long," "Heavy Rams," etc, "Clothing," i.e., "Short," and "Lambs" wool being classed separately. All wasty fleeces, and such as are tender or broken in staple, should be kept out, and unless these form a considerable proportion of the clip, it pays to class them in with the best of the bellies and pieces, as they will materially improve the price got for this class, and the grower will then run no risk of having his best sort condemned for the sake of a few unsound fleeces. The belly-wool and skirtings should have all britch-stained and locky bits taken out before being baled, and these latter, and that which comes from under the sorting table, go to make the last sort. The final sorting should therefore be approximately as follows:—

- (1) Fleeces, containing all fully grown and sound fleeces.
- (2) Clothing, i.e., "Short" or "Lambs."
- (3) Bellies and pieces: the best of the belly-wool and skirtings, including all tender and inferior fleeces kept out of the first sort.
- (4) Locks, sweepings from under the sorting table, and all stained wool from bellies, britches, etc.
- (5) Heavy rams' fleeces.

It may be said that these sorts are too comprehensive, and that more classes should be made, but in advising thus, I am speaking of the average small South African clip. Should the flock be a large one, marked variations in length and quality would undoubtedly require additional sorts, but each classer must use his own judgment in this respect, endeavouring, as I have already said, to produce the fewest possible number of sorts of even quality.

The choice of descriptive names for the fleece wool is ample and varied, there being no uniform rule. Some growers use the word "combing," and when necessary distinguish the various sorts by numbering "1st" and "2nd," and the same with "clothing." Others prefer the word "fleeces," "1st" and "2nd," or alphabetically. No matter what name be used, the prospective buyer always satisfies himself fully as to the contents of the bales before he bids.

PACKING.

The accepted method is to place the rolled fleeces into the bale in tiers of six, i.e., two rows of three, the direction of each pair of rows forming a tier, alternating until the bale is full. If the pressing is done by tramping, every second tier should be tramped, and if the presser

takes care while at work, to keep each foot on a separate fleece, the fleeces will not be torn. The writer has, by this means, turned out bales quite as neat and as uniform in weight as by mechanical power, although for speed and satisfaction, the latter is to be preferred.

WEIGHTS.

The bales should, if possible, average about 300/350-lbs., according to the condition of the wool, care being taken to avoid the mistake of packing too tightly. Great variations in the weights of the bales is also to be deprecated unless it be locks or some such heavy wool.

SEWING AND MARKING.

Every bale should be sewn neatly and securely; it shows that care has been taken, and when this is supported by neat stencilling of names, contents and marks, all uniformly and cleanly done, the clip looks attractive, and will invite inspection, whereas a buyer is inclined to look askance at a clip which is slovenly got up. It only remains for the farmer to keep his bales as dry and clean as possible, until they reach the sale rooms, and, although his efforts may not at first meet with the reward anticipated, still, by continuing his honest work, he will, in the long run, reap satisfaction in a more eager competition for his clip, which of course means a higher price.

Hens that stop laying may often be induced to resume the egg supply by a complete change of food.

There is a wide variation of opinion as to the best method of handling stable manure. Some dairymen practise hauling directly to the field from the stable. The method merits recommendation.

Not one hen-house in twenty receives due attention as to cleanliness and ventilation. Let the poultry-keeper unlock an uncleanly and ill-ventilated house in the morning, before the occupants have left, and the offensive air will convince him in a most satisfactory, if unpleasant manner, why the fowls do not thrive.

The Position of East Coast Fever.

OUTBREAKS DURING JUNE AND JULY.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st June to 19th July:—

Dundee Division.—Outbreaks on the farms "Lenteplaats," east of main line, north of Dundee-Vryheid line, "Dapelsfontein," east of main line, north of Dundee-Vryheid line.

Richmond Division.—Outbreaks on the farms "Commissie Drift," "Penavon" (Weltevreden and Cleveland on map).

Umvoti Division.—Outbreak on the farm "Rye Hill."

Impendhle Division.—Outbreaks on the farms "Carmel," "T P 20," "The Spur."

Irope Division.—Outbreaks on the farms "Lot 17. Dronk Vlei," "Lot H II," "W D 1," "Rankelvie," "A S," "A," "B of 2," "9," "Stainton," "Pen Hale" (sub-division of "Good Luck"), "Lot 3," "Block XI. Forest," "D Y," "D C," "Bonnie Doon," consisting of "s 35" and placed between "Rem. s. 35" and "Forest," "Lot C P."

Alexandra Division.—Outbreak on the farm "Fountain Head."

New Hanover Division.—Outbreak on the farm "Elands Hock."

Lion's River Division.—Outbreaks on the farms "Craignecathan," west of line (sub-division of "Hebron"), "Lidgetton," east of main line, "Boythorpe," west of main line.

Estcourt Division.—Outbreaks on the farms "The Grange," west of main line (sub-division of "Nooitgedacht"), "Solferino," west of main line, "Doveton" (sub-division of "Wilde Paarde Vlei"), west of main line, "Beacon Hill" (sub-division of "Zaai Laager"), east of main line, "Portington" (sub-division of "B of Feathersdale"), west of main line, "Pilgrim's Rest," west of main line.

Camperdown Division.—Outbreak on the farm "Saville Thorpe" (sub-division of "Honigkrantz").

Lower Tugela Division.—Outbreak on the farm "Drayton."

Bowel trouble results from numerous causes, one of the most frequent being unsanitary quarters. If food is thrown upon a foul floor the chicks are almost certain to eat some filth along with their food, with the probable result of disturbing the digestive functions.

Cedara Agricultural Laboratory.

QUARTERLY REPORT.

THE Chemist at the Central Experiment Farm, Cedara (Mr. W. R. Simpson Ladell), reports as follows to the Director of the Division of Agriculture and Forestry, on work done during the quarter ended 30th June, 1910:—

Only a few interesting samples of soil were analysed during this period:—

Percentages on Air-dried Soil.

Number.	District.	Moisture.	Organic and Volatile Matter	Insoluble Matter.	Lime.	Phosphoric Acid.	Potash.	Available	
								Phosphoric Acid.	Potash.
1	Movenie	0'90	1'41	95'46	Trace	0'026	0'025	—	—
2	"	0'82	1'39	95'49	"	0'026	0'014	—	—
3	"	9'02	7'16	69'54	0'62	0'043	0'089	—	—
4	Winterton	—	—	—	0'036	—	—	0'002	0'014

Nos. 1 and 2 are soils of very low fertility needing the application of a complete manure.

No. 3 is of very fair fertility, but would require the addition of a phosphatic manure to enable it to carry a heavy crop.

No. 4: This was an acid soil, badly in need of liming and requires the application of a phosphatic fertiliser. It is well provided with potash available for plant food.

* * *

Some samples of wattle bark gave the following results on analysis:—

District.		Percentages.		
		Total Soluble Solids.	Non-Tannins.	Tannins.
Esperanza, 6 years	...	45'1	10'8	34'3
" "green tips"	...	37'7	11'6	26'1
" 6 years	...	40'6	11'1	29'5
P.M.Burg, mature	...	47'9	16'6	31'3
"	...	48'6	18'5	30'1
"	...	44'6	14'2	30'4
Howick, 9 years	...	40'4	15'7	24'7
" "	...	43'0	17'0	26'0

The 1st sample from Esperanza is exceptionally good. It will be encouraging to wattle growers on the coast to know that bark of such excellent quality can be grown there.

A sample of limestone from a deposit found on the Busi River was examined with the results given below.

The sample contained 7 per cent. of flinty material, the remainder had the composition:—

	Percentages,
Moisture and Organic Matter ...	2'51
Sand and Insoluble Matter ...	24'95
Iron and Alumina ...	0'75
*Calcuim Carbonate ...	68'69
Magnesium „ ...	1'82
Alkalis, etc. (by difference) ...	1'28
	<hr/> 100'0

* Containing 38'47% Caustic Lime.

This limestone would be useful locally for agricultural purposes, but probably would not pay for transporting any distance.

* * *

A few fertilisers were analysed as follows:—

Blood Manure—Dundee :			Percentages,		
	*Organic Matter and Moisture	...	...	90'56
	Insoluble Matter	...	...	2'86
	Calcuim Phosphate...	...	...	1'43
	Iron Alumina, etc.,	...	...	5'15
* Containing 13'24% of Nitrogen.					
		Moisture and Organic Matter.	Sand.	Calcuim Phosphate.	Calcuim Carbonate, etc.
Bone Dust— Dundee	...	†30'2	0'31	*57'50	11'99 (Ca. 01'96)
Bone Dust— Greytown	...	*26'84	1'65	58'66	12'85 (Ca. 04'94)

† Containing nitrogen, 3'76.

* „ 2'72.

* Containing citrate soluble P. 205

„ insoluble „ 18'7

Total P. 205 ... 26'33

Superphosphate—Greytown :

	Percentages.
Moisture ...	9'75
Organic Matter ...	11'42
Sand ...	23'32
Water Soluble Phosphate ...	16'81
(Corresponding to Tricalcuim Phosphate, 26'31)	
Insoluble Phosphate ...	7'54
Calcuim Sulphate, etc. ...	31'16
	<hr/> 100'0

* * *

In view of the growing importance of the rubber industry in this country, a comparatively new source of rubber is interesting. The latex.

of the Euphorbia tree can be coagulated to a gummy material containing a good proportion of rubber.

A sample of coagulated latex from a Euphorbia tree at Winkel Spruit had the following composition:—

	Percentages.
Moisture	7.23
Dirt and Insoluble Matter	1.70
Resin	74.70
Proteids	1.81
Caoutchouc	14.56
	<hr/> 100.00

Caoutchouc is pure rubber. Natural rubber always contains a certain amount of resin and proteids, but a large quantity of these substances detracts considerably from the value of the rubber.

In this laboratory we have separated the greater part of the resin from the rubber, obtaining comparatively pure black rubber and a good yellow resin, which would be useful for varnish making and other purposes. A large quantity of the latex is being examined with the object of seeing if the process could be worked on a commercial scale.

Samples of "rubber" and latex from a vine in the Ngomi Forest were examined with disappointing results.

The "rubber" was black in colour and very hard, possessing little elasticity. The following results were obtained on analysis:—

	Percentages.
Moisture	8.16
Ash	2.56
Resin	44.40
Proteids	30.25
Caoutchouc and Insoluble Matter	14.63

The latex was coagulated by exposure in the laboratory and the coagulant was squeezed free from the absorbed water and analysed:—

	Percentages.
Moisture	9.65
Ash	2.54
Resin	42.08
Proteids	31.69
Caoutchouc and Insoluble Matter	14.14

The above figures show that this material could not be utilised commercially in its present state, both on account of the large amount of resin present and the high proportion of protein. Samples might be forwarded to the manufacturers at Home to see if they could do anything with it, but in any case the material would not command a high price.

Forestry.

REPORT FOR MAY.

THE Chief Forest Officer, Natal, reports as follows to the Director, Division of Agriculture and Forestry, for the month of May:—

During the month of May, Foresters have been mostly occupied in burning firebreaks wherever possible round the timbered areas of Crown forests. In many districts the veld was in a very favourable condition for such work by the Forester alone without assistance, the late rains having made every shady spot a barrier preventing fires from getting out of hand. These early brands will now assist in checking fires put in later, and thus save cost of extra labour. Forester Foster, of 'Ngomi, has decided to defer his absence on leave granted until his forests are safe, as the natives around him are continually setting the veld ablaze irresponsibly. This offence is a very difficult one to bring home to the culprits, and Forester Leigh, of Entumeni, is trying to find out who scorched some of his bush during May. Happening thus early in winter in the green leaf what may be done in the dry? Yet there are people who will say that bush cannot be destroyed by fire. At the Impetyene, in the Ingela, Forester Tuslin reports having nearly completed this protection of the forest during May. At the Zuurberg, in the same district, no firebreaks were made, though a little was done in April and since the beginning of June. The Bulwer and Qudeni reports omit mention of this necessary work, and Foresters are being referred to.

The shooting season opened with a good demand for permits, and the licenses issued under them, by the new tariff, should bring in some return for the strict preservation of game which has been maintained for many years in departmental Crown forests. From every station the reports of the stand of game are good, and denote that thinning out is desirable. For the information of those who do not read the *Gazette*, the charges are 10s. for each bush-buck ram, 5s. for each duiker ram, and 1s. for each "ipito," hare etc. At present licenses can be obtained from any Forester on production of permit and on payment as above. Permits are best obtained through the local Forester, as his report on the circumstances and stand of game may be required, thus saving a reference back to source of application.

At Bulwer the sheep-killing leopard was shot through both shoulders on the 3rd May, and though lost sight of is probably dead. Native boys and dogs accounted for a very large leopard and its mate in the Berg, near Hlatikulu, Mooi River, according to Forester Mason; while another,

which had been killing the goats of natives "wholesale" is about to be tackled by the Natal Police beyond Giant's Castle Game Reserve. Forester Symons, of the latter station, nearly lost one of his dogs in a skirmish with baboons on the 4th May, but, though badly mauled, the Irish terrier has recovered. Forester Symons killed the baboon—a large male—and also a full grown female pulled down at the same time by his bull terrier. He finds these dogs exceptionally good, and is training them to leave buck alone. They should prove of great value in assisting to keep down vermin in the Reserve. A vaal-rhebok was caught in the traps, but Forester Symons thinks that such accidents cannot really be helped, as the larger vermin naturally frequent the paths used by buck. There is one kind of vermin which cannot be caught in traps, and which neatly rolls up the hides of its victims and stows them away under cover. Both from Giant's Castle and from Alfred County the depredations of this species is reported, Forester Tustin finding the folded skin of a bush-buck hidden in the Impetyeni during May. He is now on the watch for further clues to the identity of the poacher. One of the pests well in hand owing to good work in the past is the locust, Forester Tarboton, of Empangeni, and Forester Green, of 'Ngoya, both reporting that no sign of swarms have been seen on the coast of Zululand.

By the courtesy of Mr. H. M. Raw, Forester Tustin was allowed an inspection of the trout in a stream on his farm "Elandsdrift," in the Ingeli. He reports every pool swarming with fish nine inches long and over, and suggests that trout be placed in the streams of Empetyene and further forests, which, though near to Mr. Raw's stream, belong to a different system. This suggestion, to my knowledge, was made as far back as 1894, but it is not too late to use it. I visited Forester Auld on 15th May and accompanied him to the Ingudwini, where he is permanently marking the sites of beacons hitherto denoted by holes with wooden pegs alongside. In spite of a warning through the Natal Police to them, the native squatters in the Sonda Forest have been since giving Mr. Auld a lot of trouble, and I am glad to be able to report that some have since been brought to book by the Magistrate, Ixopo. Other cases are pending, but from Foresters' verbal report to myself I think it necessary to evict all of them in order to obtain a manageable set of tenants later. I submit this for your consideration. At the 'Ngomi, Forester Foster is still unable to get any of the defaulting native squatters to work in the forest nursery as kindly offered them; neither will they pay their huge arrears. I could make them do both if given a free hand.

In a supplementary minute Forester Leigh suggests that Clause 28 of Proclamation 58, 1903, should not apply to *Kolwa* huts in Zululand. The intention of the Clause was to empower the Conservator of Forests to enforce the proclamation generally in Zululand without interfering

with such rights to forest produce as the natives had in a state of savagery. Waiving the tradition that in that state chiefs enforced certain forest regulations of their own with the knobkerrie, and the fact that since British rule began regulations of considerable strictness have been enforced, this allowance of free produce, for domestic use only, would be fair enough, if the setting apart of many bushes for native use untrammelled by any regulations was accompanied by the demarcation, as reserves free from the operation of Clause 28, of the principal Crown forests outside the native location. Though the clause could hardly have been intended to cover material for building cottages for *Kolwas*, it does not specify any kind of hut, and I certainly would not alter it to exclude square buildings. A straight wattled wall is nothing like as strong as a circular one, and it will be found that the square hut of wattle and daub will give place to one of brick—sun-dried—and of shale stone where handy, to the advantage of the natives and of the forests.

Immense, however, as is the damage done to bush by the wholesale cutting of wattles for the perishable huts of the natives, it is as nothing compared with the absolute destruction wrought by fire to clear areas for cultivation. I have seen so much of it, and have so often deplored the carelessness of those in authority able to prevent it, that I am sure that nothing short of making it a penal offence to so clear the remnants of our native forests, on public or private lands, will create a public opinion alive to its atrocity.

15th June, 1910.

REPORT FOR JUNE.

The Chief Forest Officer for Natal reports as follows for the month of June:—

Very cold weather is reported from most stations. At Bulwer it is even said that such low temperatures have not been known for many years, and Forester Purser notes that bushbuck come out of the Marutshwa to sun themselves within fifty yards of the forest lodge. Violent winds are reported from Giant's Castle, Olivier's Hoek, and 'Ngomi, but, though great drought prevailed in some districts, rain and mist gave a foretaste of spring at 'Ngomi, on the north-west of Zululand, and at Ingwangwane and Ingeli, on the East Griqualand border.

Foresters' returns show in most cases a good accomplishment of fire-breaks around the wild forests, Forester Fernando heading the list with fifteen miles' length of fire-lines. Forester Tustin completed the protection of the intricate and extensive boundary of the Impetyene—one of the most valuable and beautiful of our Crown forests—just in time

to prevent damage from a runaway farm fire. Forester Chilvers has also been at work and has probably, at date of writing, secured the forests in the smaller Ingeli district. Forester Foster reports having nearly completed the protection of the woods in the 'Ngomi Forest. Forester Purser has burnt three miles at the Xumeni and Inkonza—forests remote from his residence—and Forester Meyer, on the Transvaal border, obtained the assistance of adjoining farmers in protecting the forests of his large district. In Zululand, Forester Leigh, Entumeni, and Forester Household, Qudeni, report work of this character.

Timber-working in Section C, Impetyene, has ceased, Forester Tustin reporting that the state of the roads has made transport impossible. Mr. Shuttleworth's enterprise was most praiseworthy, but the combination of East Coast Fever and execrable roads was too much for him. The Zuurberg forest, in the same Ingeli range, is tapped by a main road, and Forester Chilvers suggests that compulsory dipping of cattle may relax the fever regulations sufficiently to allow of bush-work again at an early date. This is to be devoutly hoped, the stringent regulations being harder upon the sawyers, temporarily, than the worst results of the disease could be finally.

In Zululand the lessee of the forest sections has arrived at Qudeni but I do not know if he is going to stack sawn timber to await transport. It would get a good chance of thorough seasoning, I think. A little flatcrown filling was done in the Mtunzini Division, and Forester Green reports that the Railways Department filled waterbooms for trial as sleepers. Forester Leigh, at Entumeni, in Eshowe Division, issued permits during June for 472 bundles of wattles under Clause 28 of Proclamation 58 of 1903.

Examining old workings in the Hlabeni Forest, Ingwangwane, Polela, Forester Fernando found the rate of natural regeneration well represented by young trees, obviously originating since the abandonment of the forest by sawyers about twenty-five years ago. The annual rings of a few samples taken by Forester showed twenty for *Trimeria alnifolia*, eighteen for *Halleria elliptica*, and fourteen for sneezewood. There were close by an old sawpit, and the site, hard trodden, would not have been in a fit condition for seed-germination for a few years after work had ceased. The more fastidious sneezewood would naturally be slower to germinate, as reflected by the samples taken. The growth of young stuff in and around the pit is satisfactory in quantity as well as in quality and speaks well for the natural vitality of our wild bush. Of course there are many ruinous "Sawyers-glades" in the Hlabeni, as in other forests worked before section-marking was enforced, but in order to judge the future effect of the marking in the Xalingena Forest in his district Forester Fernando made a short excursion across the Ingwangwane to the Insikeni Forest, in the Cape Colony. Here a section, cut

out fifteen years ago, had been marked by a District Forest Officer, and carefully protected since by the local Forester. This section showed that it had been marked neither more lightly nor more heavily than the two sections in the Xalingena with a successful result. As our sections were first marked lightly by Forester Fernando, and then more heavily by my directions, we are equally gratified by the vigorous growth of well-shaped forest trees in the section at Insikeni. The new crop in the latter is usually mixed as to species, but there are pure thickets of young yellow-woods. Sneezewood is common in the level parts, showing that its scarcity in similar sites in Natal is due to its being absolutely cut out where accessible rather than to the preference for steep land attributed to it by some people. Such cutting-out of a valuable species is only to be prevented by the system of marking, and it is to the tardiness of the recognition of this that the ruin of many of the best forests in Natal is due.

During June little hunting was done in Crown forests. From Giant's Castle, Forester Symons supplies a list of 277 head of vermin destroyed during his tenure of the forestership, as a reply to those who consider the Game Reserve more of a breeding-place for vermin than the numerous adjoining barely occupied farms. He observed in one day in June fourteen rooi-rhebok on the Reserve, and Forester Mason saw six in the Ilatikulu, Mooi River. These may have fled from Basutoland. Forester Tustin reports a herd of rhebok at the Impetyene, which he thinks have escaped from East Griqualand hunters, and hopes will remain in Natal. Our poachers may poll-tax them, though I hope that they will realise that they are under the care of Mr. Tustin.

Contraventions during June have been few and of a petty nature. Forester Symons had some hunting trophies—Government property—stolen from the lodge at Giant's Castle, presumably by a former kitchen-boy.

G. H. DAVIES,
Chief Forest Officer, Natal.

15th July, 1910.

One rarely hears nowadays the remark which formerly met you everywhere, if you spoke of starting poultry farming or even discussed it as a payable proposition. "Don't waste money! When you have got a flock together, *fowlsickness* will come and sweep away the whole lot, possibly in one night," and the reason of this is, that fanciers being the owners of stock of considerable intrinsic value have been compelled to deal with them on common-sense lines—that is, see that they are kept under sanitary conditions and that they are fed on scientific principles, such as would be applied to the rearing of any other valuable animals.—(*S.A. Poultry Journal*.)

Eradication of Ticks.

AN EXPERIMENT WITH THE STARVATION METHOD.

IN the July number of the *Cape Agricultural Journal* appears an interesting article entitled "Eradication of ticks by the Starvation Method," by Messrs. H. E. Law, B.Sc., F.I.C., and B. Manning, Gonubie Park, East London. The subject is one which is of very great interest to Natal stock-owners, and, in view of this fact and of the importance of the article, we feel that no apology is necessary for reproducing the article just as it stands.

The part played by the different species of ticks (Messrs. Laws and Manning remark) in the transmission of various diseases amongst stock and domestic animals is unfortunately too well known to all owners of stock running on the coast veld of the Cape Colony, to be cited her.

If the presence of the tick is essential to the propagation of the disease, then tick eradication will eventually result in its extermination.

We know of no case where any species of tick, and hence the disease conveyed by it, has been completely exterminated, but the ravages of many have been reduced, and the disease controlled in a number of instances. Our work here during the last few years has proved beyond doubt that it is possible for any persevering farmer to keep the ticks in a state of suppression to such an extent that losses from the diseases conveyed by them are reduced to a negligible quantity. This is emphasised particularly by the fact that, in the early stages of our experimental work, losses amongst sheep and calves due to Heartwater were frequent and numerous.

Cases of Heartwater amongst our calves are not practically non-existent, and during the later stages of our sheep grazing no deaths whatever occurred from this disease.

The methods hitherto adopted for eradication of ticks are:—

1. Periodic dipping of the hosts.
2. Grass burning.
3. Enclosing of defined areas for a sufficient length of time to ensure all ticks dying off through the absence of hosts.

We will deal with these three methods categorically.

1.—DIPPING OF HOSTS.

Dipping is undoubtedly the best method for eradicating ticks, provided an efficient dip be used. We have proved by a series of experiments that the most efficient and economical dips contain arsenic in some form, although a number of other substances are almost as effective in

destroying ticks, and some of these can be used with advantage in conjunction with arsenic.

Dipping must be periodic; the intervals between each dipping varying with the species of ticks which are to be eradicated.

Cattle dipping has been in progress here for past five years, but it is only for the past two years or more that stringent methods have been adopted. The interval between each dipping is 14 days, and the eradication is carried out by a system of rotation. Each camp is overstocked in turn with cattle, which are dipped fortnightly, until the pasture is so low that the animals cannot maintain their condition; then they are moved to another paddock and the work continued there until the same stage is reached. The cattle are then either moved into a third paddock, or returned to the first. This overstocking reduces the natural covering for the ticks, and the cleansing of each paddock is therefore done in a minimum amount of time.

By this means we have practically now not only exterminated every species of tick, but have also improved the condition of the veld, an achievement which is impossible when burning or starvation is adopted.

2.—BURNING OF GRASS.

This has been practised by a number of farmers, and doubtless burning does destroy a certain number of ticks if it is done when the ticks are on the top of the grass.

The best time to burn for the destruction of ticks is in March and April; but even then only a small proportion of the ticks are destroyed, and if no other means are adopted, total eradication must be regarded as out of the question.

Burning is also to be deprecated on account of the impoverishment of the pasturage which must of necessity result.

3.—STARVATION,

Or enclosing of defined areas for a sufficient length of time to ensure all ticks dying off through the absence of hosts.

If a tick is confined in an enclosed space for a sufficient length of time it will eventually die of starvation. Experiments have been carried out by Mr. Lounsbury and others to ascertain the period which the different species of ticks will survive without access to hosts, and a few experiments in this connection have been done in the Laboratory here with the following results:—

On 4th November, 1908, fully gorged female bonts, brown, blues and reds, were placed in separate tubes in the incubator. In due course the laying was completed and the larvæ hatched out.

On 1st June, 1909, the larvæ of all species had started to die, the browns showing less life than the others.

On 16th December, 1909, all the browns were dead, but some of the bonts, blues and reds were still alive.

On 1st February, 1910 (15 months after), a few bonts and reds were still alive, but all the blues were dead.

By the end of March, 1910, all the bonts and reds were dead.

From these results one would conclude that if an area be enclosed so that no possible host has access to it the ticks in that area would be exterminated well within the space of two years. Theoretically this would be the easiest way of eradicating ticks, but in practice many difficulties arise which complicate matters. Not the least important of these is due to the fact that it is almost impossible to enclose a paddock of sufficient dimensions for the requirements of this experiment so that no ground game nor birds of any kind can have access to it. There will not only act as hosts for the ticks (in the paddock) which desire to feed, but will also be the means of bringing in ticks from beyond the enclosed area.

The idea of enclosing a small space free from bushes, about one or two acres in extent, by means of double fences situated about 10 feet apart, the outside being supplied with netting to keep out all game, was first of all considered, but was discarded as being impracticable. If this course were adopted, although the grass could be burnt at the commencement in order to drive out all game, we would still have to contend with birds. Our experiment, strictly speaking, does not give us any information regarding the period ticks will survive without feeding on a host: it was merely intended to ascertain the effect of keeping pasturage free from stock for considerable periods, and so compare its influence on the extermination of ticks with overstocking of similar pasturage, and dipping at fortnightly intervals. We desired to make a practical test which could be undertaken by any farmer who is willing to allow parts of his veld to lie idle for a time.

The camp selected at Gonubie Park for the purpose is enclosed with a single 4 feet 6 inch, six strand, wire fence, one barbed and five plain, about 160 acres in extent.

Down the centre of the camp runs a ravine, the banks of which are covered with brushwood and trees, which spread, in one part, into a bush about one hundred yards wide. The lower portion of the camp is flat pasture land with coarse ferns distributed amongst the grasses. In the upper portion the one side of the camp is covered with scattered mimosa trees, notoriously excellent covering for such ticks as bonts, which require shade. In summer the grass is often three feet high in this portion. On the other side of the ravine are clumps of bushes which afford splendid cover for ticks. The grass was only of a moderate height between these bushes, being of the variety commonly called "rooi grass."

Owing to the nature of the area enclosed, game, especially hares and duiker, is fairly plentiful; and although several determined efforts were made to drive them out during the time the camp has been enclosed, yet the retired position of the camp, and the absence of foreign life within its precincts, were sufficient inducement for the buck and hares to return to it.

Several duiker have been shot at different times in the camp, and on examination we have found them well infested with larval and nymphal reds, browns and buck ticks (*Ixodes pilosus*).

On 1st May, 1908, the camp was enclosed, and at the end of 12 and 18 months, respectively, clean cattle were put into it for three days, when on examination they were found to be well infested with ticks.

On 2nd February, 1910, 21 months after the camp had been closed. its degree of infestation was again tested. Three beasts were cleaned of ticks by hand, and then sprayed with a mixture of paraffin and water to kill any larval or nymphal ticks which might be concealed by the hair. They were then driven into the camp and allowed to remain there for three days, i.e., until 5th February, 1910. On examination, after being taken out, the following ticks were found:—

- 2 Red ticks (*R. evertsi*).
- 44 Cape brown (*R. capensis*).
- 2 Brown (*R. appendiculatus*).
- 3 Blackpitted brown (*R. simus*).
- 3 Male and 1 female Bont (*Amblyomma hebraeum*).

The above gives a total of 55 adult ticks. The number of cattle was so small, and the area so large, that the number of ticks found does not convey any idea as to the degree of infestation of the camp. After this examination of the camp, and on account of the results obtained, we proposed to burn the grass before making our next test. We were approached by Mr. Lounsbury and Mr. Borthwick, who asked us to allow the camp to remain unburnt. Finally it was decided to burn one half and leave the other; then erect a temporary fence dividing the burnt from the unburnt portion.

The burning of the camp was done thoroughly on the 22nd March, 1910. That portion which contains the most thorn bushes was burnt, and the more open veld left. The erection of the fence was commenced immediately afterwards within the burnt portion, leaving a margin of about 30 feet wide of burnt patch running right down the unburnt side of the fence, to prevent any ticks from the unburnt crawling through to the burnt section.

THE FOURTH EXAMINATION OF THE CAMP.

The Burnt Section.—On the 10th May, 1910, ten beasts, which had been dipped on the 7th May in the Gonubie Bath, were cleaned of ticks

by hand, and immediately driven into the burnt portion of the Starvation Camp. They were taken out 72 hours after being put in, *i.e.*, on May 13th, and immediately examined, with the following results:—

On the 10 beasts only four adult ticks were found. Owing to such a scarcity of ticks on these 10 beasts, it was decided to repeat the experiment. The same 10 beasts were driven back into the burnt portion of Camp on May 13th. On May 17th, *i.e.*, 96 hours later, they were taken out and immediately examined, with the following results:—

On the 10 beasts 32 adult ticks were found. In addition, one beast was found to be infested in the bottom of its ears with larval and nymphal reds. (For details of ticks found, see end of article.)

On the conclusion of this examination it was decided to compare the state of the burnt section of the Starvation Camp with some of the farm camps which are being cleaned in rotation by over-stocking and fortnightly dipping, and have not burnt for six years at least.

On May 17th these cattle, after thoroughly cleaning by hand, were put into the largest camp on the farm, at the Gonubie Mouth, and allowed to run there until May 20th, when they were taken out for examination.

On the 10 beasts only 20 adult ticks were found. They were also free from larvæ and nymphs.

The Unburnt Section.—At 5.30 p.m. on May 10th, 10 beasts were cleaned of ticks and driven into the unburnt portion of the Starvation Camp, and remained there until 9 a.m. on May 14th, when they were subjected to examination. On the 10 beasts 21 adult ticks and one nymph were found. In order to make a true comparison between the degree of infestation of the burnt and unburnt section of the camp, these 10 beasts were put back into the unburnt portion of the camp and allowed to remain there until May 17th, when they were brought out and examined the second time. In each instance the cattle were prevented from grazing on the burnt margin near the temporary fence. On the 10 beasts 37 adult ticks were found. In addition, one beast was found with larval reds in its ears.

These 10 beasts were, after being cleaned, put into the "Sea Camp," another of the camps near the foreshore, on May 17th, where they remained until May 20th, when they were taken out and examined. On the 10 beasts only 16 adult ticks were found.

In the first part of this experiment the cattle were in the unburnt portion a few hours longer than those in the burnt portion, but even allowing for this, there are fewer ticks in the burnt section than in the unburnt.

This bears out the theory that grass burning at the right season destroys a number of ticks.

DATA.

EXPERIMENT 1a.—THE BURNT SECTION.

No.	Beast. Mark.	Ticks Found.
1	0002	No ticks
2	2130	No ticks,
3	1231	No ticks,
4	2022	1 male bont on nipple.
5	2202	No ticks.
6	3000	Cluster of small ticks down in right ear (larval reds).
7	3112	2 male reds under tail.
8	0121	No ticks,
9	2011	No ticks.
10	0202	1 male red under tail.
Total adults :		1 male bont.
		3 male reds.
		—
		4

One cluster of Larval Reds.

Cattle in camp from 4.30 p.m. on May 10th until 4.30 p.m. on May 13th.

EXPERIMENT 1b.—THE BURNT SECTION. REPETITION OF 1a.

No.	Beast Mark.	Ticks Found.
1	0002	1 female <i>I. pilosus</i> on shoulder. 1 ditto on sheath. 1 female <i>I. pilosus</i> in ear. 1 ditto on escutcheon. 1 ditto (engorged) on shoulder.
2	2130	1 male brown in ear. 1 female <i>I. pilosus</i> in ear. 1 female <i>I. pilosus</i> on escutcheon. 1 male <i>appendiculatus</i> in ear.
3	1231	1 male brown in ear. 1 female <i>I. pilosus</i> in ear. 1 female <i>I. pilosus</i> (engorged) on shoulder. 1 male <i>I. pilosus</i> crawling on shoulder. 1 female bont on hind leg.
4	2022	2 female <i>I. pilosus</i> in ears.
5	2202	1 male brown in ear. 1 female <i>I. pilosus</i> in ear. Cluster of larval reds in ear. 1 red in ear. 1 male bont under tail. 1 male bont on leg. 1 male and 1 female <i>I. pilosus</i> on hind leg.
6	3000	1 female <i>I. pilosus</i> in ear.
7	3112	2 female <i>I. pilosus</i> in ear. 1 ditto in eyelid. 1 ditto between legs.
8	0121	1 female brown in ear. 1 female <i>I. pilosus</i> on ear.
9	2011	No ticks.
10	0202	1 female brown in ear. 1 male red under tail.
Total adults :		21 <i>Ixodes pilosus</i> ,
		6 browns,
		2 reds.
		3 bonts.
		—
		32

One Cluster Larval Reds.

Cattle were in camp from 5 p.m. on May 13th until 5 p.m. on May 17th.

EXPERIMENT 2a.—UNBURNT SECTION.

Beast.		Ticks Found
No.	Marks	
11	2001	No ticks.
12	1221	2 female bonts and 1 male bont, about $\frac{1}{2}$ inch apart on scrotum, 1 male brown in ear.
13	0211	No ticks
14	1030	1 male brown in ear. 1 female in brush.
15	2002	1 male brown in ear. 2 male and 1 female reds under tail.
16	1211	No ticks
17	0220	1 male red and 1 female brown in brush. 1 engorged female <i>I. pilosus</i> on shoulder.
18	0013	No ticks
19	1120	1 male and 1 female <i>I. pilosus</i> (engorged) together on female dewlap. 1 male red under tail. 1 male bont under tail
20	1112	1 female <i>I. pilosus</i> on eyelid. 1 nymphal red in ear. 1 male brown on sheath. 1 male bont on shoulder. 1 male bont on escutcheon.
Total adults :		6 browns 5 reds. 4 <i>I. pilosus</i> . 6 bonts.

21

One nymphal red.

Cattle were in camp from 5.30 p.m. on May 10th until 9 a.m. on May 14th.

EXPERIMENT 2b.—REPETITION OF EXPERIMENT 2a.

Beast.		Ticks Found.
No.	Mark.	
11	2001	2 male browns in brush. 1 male <i>I. pilosus</i> in brush. 1 female <i>I. pilosus</i> and 1 male together on dewlap.
12	1221	1 female <i>I. pilosus</i> on ear. 2 male and 2 female browns in brush. 1 female <i>I. pilosus</i> on nipple.
13	0211	1 male brown in ear. 1 male red under tail. 1 female brown in brush. 1 red on nipple
14	1030	1 male brown in ear. 1 male and 1 female brown in brush. 1 female <i>I. pilosus</i> on chest
15	2002	1 female <i>I. pilosus</i> on ear. 2 male browns in brush.
16	1211	1 female brown on nipple.
17	0220	1 male brown in ear. 3 males and 1 female brown in brush.
18	0013	1 female <i>I. pilosus</i> in ear. 1 ditto on shoulder.
19	1120	No ticks
20	1112	2 female <i>I. pilosus</i> on eyelid. 1 female <i>I. pilosus</i> between legs. 3 female and 1 male brown in brush. Cluster of nymphal and larval reds in ears.

Total adults : 2 reds.
23 browns.
12 *I. Pilosus*.

37

One Cluster of Larval Reds.

Cattle were in camp from 10 a.m. on May 14th until 4.30 p.m. on May 17th.

EXPERIMENT 3a.—COMPARISON OF STARVATION CAMP WITH CAMP AT GONUBIE MOUTH.

Beast.		Ticks Found.	
No.	Mark.		
1	0002	1 female brown in brush.	
2	2130	1 female <i>I. pilosus</i> (engorged) on dewlap.	
3	1231	No ticks.	
4	2022	1 female <i>I. pilosus</i> (engorged) on escutcheon. 1 female <i>I. pilosus</i> on escutcheon.	
5	2202	1 male brown on ear. 1 male bont at back of shoulder. 2 female browns in brush. 1 female <i>I. pilosus</i> (engorged) on fore-leg. 1 ditto (engorged) on nipple.	
6	3000	1 female brown in ear. 1 female <i>I. pilosus</i> on scrotum.	
7	3112	1 male brown in ear. 1 female <i>I. pilosus</i> under tail.	
8	0121	1 female brown in ear. 1 female <i>I. pilosus</i> between hind l gs.	
9	2011	1 male bont under tail.	
10	0202	1 female <i>I. pilosus</i> (engorged) on cheek. 1 male brown on sheath. 1 female brown in brush.	
Total adults :		0 reds, 9 browns, 9 <i>I. pilosus</i> , 2 bonts.	
		— 20	

Cattle were in camp from 5.30 p.m. on May 17th until 4 p.m. on May 20th.

EXPERIMENT 3b.—COMPARISON OF STARVATION CAMP WITH SECOND FARM CAMP NEAR FORESHORE.

Beast.		Ticks Found.	
No.	Mark.		
11	2001	1 female <i>I. pilosus</i> . o. cyclid	
12	1221	Free from ticks.	
13	0211	1 male brown in brush.	
14	1030	1 male red under tail.	
15	2002	2 female browns and 1 male brown in brush.	
16	1211	No ticks.	
17	0220	1 male red under tail. 1 male brown in brush. 1 female brown on nipple. 1 female <i>I. pilosus</i> on flank.	
18	0013	Cluster of larval and nymphal reds in ears.	
19	1120	1 female <i>I. pilosus</i> on ear. 1 ditto on dewlap. 1 male red under tail.	
20	1112	2 female reds under tail. 1 female brown in brush.	
Total adults :		5 reds, 7 browns, 4 <i>I. pilosus</i> , 0 bonts.	
		— 16	

Cluster of Larval Reds.

Cattle were in Sea Camp from 5 p.m. on May 17th until 4.30 p.m. on May 20th.

CONCLUSIONS.

From the above data it is obvious that the method of starvation reduces considerably the number of ticks within the enclosed area, and that, if starvation be combined with the burning of the grass, the num-

bers are still further reduced; but so long as game have access to the enclosed area, total eradication is out of the question, the large majority of the ticks remaining there being species which are often found on all kinds of game, particularly bush buck and duiker.

The tremendous difference in the number of ticks found at the first and second tests of both portions of the Starvation Camp is probably due to the fact that the cattle had recently been dipped at the time the first test was made, which gives the cattle a certain protection for a short time. The results of the second tests can be taken as normal; and these we must take as our standard when comparing the degree of infestation of this Starvation Paddock with the other grazing paddocks on the farm. When this standard is taken we find that both the grazing paddocks are cleaner than the burnt portion of the Starvation Paddock, and infinitely cleaner than the unburnt portion.

Thus we have proved beyond doubt that periodic dipping in an efficient dip at intervals of not more than fourteen days is a superior process for the extermination of ticks of all kinds than starvation, and at the same time the former method has the advantage over the latter in that it can be carried on in conjunction with the ordinary farm work. Incidentally the nature of the pasturage is considerably improved by the former process, whereas the latter tends to impoverish it.

Our experimental work here was undertaken primarily with the object of eradicating bont ticks—hence the fortnightly interval was adopted for each dipping.

Seeing that we found only two bonts in the two camps, covering an area of 1,000 acres, or more than one-third the extent of the farm, the results may be regarded as highly satisfactory. But there are still as many browns and reds in these camps as in the burnt portion of the Starvation Camp. This is on account of the fact that these species stay on the host for such a short time that the majority of them escape the dippings. Fortunately they require only a weak dip to destroy them, and this can be used at more frequent intervals than that which is required to kill female bonts.

It is quite possible that in due course, if our work here is continued on the same lines as in the past, we shall be as successful in exterminating brown ticks as we have been with bonts; but, in view of the fact that East Coast Fever is approaching the Colony, this process would necessarily be considered far too lengthy with such a long interval between dippings on those farms where ticks have been allowed to increase and no means have hitherto been devised for controlling them.

To meet the requirements of such cases, dipping (or spraying) every seven or five days would be necessary. This process would incidentally destroy all other species of ticks.

EXPLANATORY NOTE.

It is desirable to explain that "Gonubie Park" is a property belonging to Wm. Cooper and Nephews, the makers of the well-known "Cooper's Sheep Dip." It is on the coast about ten miles east of East London, and formerly was about as badly infested with ticks as any property along the coast. The Bont, Blue, Brown, and other kinds of ticks abounded, and tick-borne diseases were rife. The firm desired to secure a badly-infested farm in order to conduct experiments in tick eradication, and to test the value of likely substances as dipping fluids to destroy ticks in the hope of finding one less objectionable than those in use, and in their quest of a suitable place they had the assistance of the late Dr. D. Hutcheon. The senior writer of the above notes, Mr. H. E. Laws, is a professional chemist in the employ of the firm who came to South Africa in connection with the preparation of promising dipping mixtures for use against the ticks. Little progress had been made in clearing the veld of the pest up to the time of his coming, and it being recognised that he was a capable, painstaking man, fully appreciative of the necessity for *thoroughness*, he was asked to take entire charge of the farm. The Government Entomologist visited the place just before he assumed control, and, after an inspection of the cattle and of the veld, he pronounced the place still so badly infested by ticks, particularly by the Bont Tick, that one was warranted in dating a start in cleaning the place from that time. Ticks in all stages were present on the stock, active, nymphal and adult Bont ticks were found without difficulty on the ground in the veld, larval ticks were abundant on the vegetation, and it was not uncommon to find unfed adults of the Brown Tick waiting on the grass tops. In the two years that have passed Mr. Laws has practically cleared the place of the pest, as he describes in his article. Two male Bont ticks, five Red, sixteen Brown, and thirteen Russet (*I. pilosus*) was the sum total of the ticks found on twenty cattle after running them three days in camps which two years before it was really cruelty to put animals into on account of the numbers of the pest. The secret of the success was thoroughness in carrying out the dipping. There was no guess-work in preparing the dip, no failure to have every beast found, and no postponement of the dipping time for inadequate reasons; and what Mr. Laws has accomplished at Gonubie Park, can be accomplished elsewhere just as quickly if the same thoroughness is exercised.

It was at the special request of officers of the Agricultural Department that Mr. Laws tested the "starvation" plan of clearing the veld of the pest. His results show clearly that by careful work a given piece of veld can be cleared quite as quickly when it is fully pastured with cattle.

as it can by excluding all stock for two years, that is with the Bont and the other kinds of ticks mentioned to contend against. It will be observed that Mr. Laws does not once mention the Blue Tick, the commonest of all the ticks ordinarily and the one that corresponds with the common cattle tick of Texas, Argentina and Queensland. The Blue Tick, owing to its short life cycle and habit of remaining on the host to moult, quickly disappeared with fortnightly dipping thoroughly carried out. More ticks were picked up by the test cattle at the end of two years in the 160 acres of closed camp than in the thousand acres of regularly pastured veld. Disregarding the Russet ticks (*Ixodes pilosus*) 42 adult ticks were picked up in the former against 23 in the latter. The Russet ticks can be safely ascribed to the presence of the buck in the camps, as all stages of this tick are very common on them, and the larval and nymphal ticks from the closed camp probably came from the same source. Moreover, it is quite probable that a large proportion of the other ticks had fed as larva or nymph, or both, on bucks or other wild animals. With persistent dipping of the farm stock at short intervals, the number from the wild animals is bound to grow less and less as time goes on. The number of ticks now left on Gonubie Park is evidently so small that East Coast Fever would spread very slowly if at all there. The losses would be so infrequent that they would scarcely be felt. Is there any other farm along the coast of which this can now be said?

THE MOTOR PLOUGH.—Ploughing by motor is now largely practised in the wheat-growing districts in North-Western Canada, and, in general, petrol seems to be superseding steam in the many mechanical operations, which the great extent cultivated by the individual farmer drives him to employ, instead of horse work. It is stated that a 4 ton 24 horsepower motor will break up from 12 to 20 acres per day, and with a harvester, will cut and bind more than twice that area or harrow still more, while as a traction engine, it will haul ten tons at a speed of four miles per hour. Calculations show that in Canada ploughing, discing, harrowing and seeding one acre by a two-horse team costs about 25s. and takes two days, while a motor of the size mentioned does the same work, including all labour, depreciation, etc., for about 10s. The motor is also used there for all kinds of farming operations when not hauling in the field.—(*Dalgety's Review*.)

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

REPLYING to an inquiry by a correspondent on the subject of distemper in dogs, Mr. A. H. Cory, Government Veterinary Surgeon, Queensland, advises the following treatment:—Good nursing is the chief factor in dealing with distemper. The dog should be fed on good, nutritious, and easily-digested food, such as milk, tripe, etc.; also, he must be kept warm and comfortable, and not be allowed to lie on damp ground. One of the best pills I know of is made up as follows:—

P. Ipecac Co.	...	...	...	gr. $\frac{1}{2}$
Hyd. c. Creta	...	...	...	gr. $\frac{1}{2}$
Sodii Bicarb.	...	...	...	gr. 1
Sacch. Lac.	...	...	...	gr. 2

Give one or two pills three times daily, according to the size and age of the dog.

Stone-Gathering Machines.

In the April number of the *Journal of Agriculture* of South Australia an account is given of the various machines for gathering stones which have been tested from time to time in connection with the bonus of £100 offered by the Government for the best machine. So far, the best machine which has come forward is that invented by Messrs. J. and R. Forgan, of Port Pirie, which was awarded 83 points out of the maximum possible of 100. The next best machine was one invented by Mr. W. Heithersay, of Belalie North, which was awarded 62 points. The judges' scoring was as follows:

	Maximum Points.	J. & R. Forgan's Machine.	W. Heithersay's Machine.
Efficiency ...	45	40	25
Gathering stones free from soil ...	10	7	7
Cost of Clearing ...	20	15	9
Strength of Machine	10	9	6
Simplicity of Construc- tion and Working	7	5	7
Cost of Machine ...	8	7	8
Total ...	100	83	62

The *Journal* remarks:—"It was generally agreed by those present that Forgan's machine was clearing the ground better than was the general practice with hand-picking, and that the work done was better than they had expected any of the machines to perform. This machine went over large stones and fixed stumps without injury. With a five-horse team and one man this implement would treat eight to ten acres a day.

For gathering stones for road-making in stony country it will undoubtedly prove an acquisition."

Rations for Pigs.

The *Queensland Agricultural Journal* for June publishes particulars of the rations for pigs which have been found valuable and practical in the United States, Denmark, and Germany. The rations are as follows:—
 UNITED STATES: *For pigs of 20-FJ lb.*—(1) $\frac{3}{4}$ lb. maize meal per gallon of skim milk; (2) a mixture of one-third maize meal, one-third bran, and one-third gluten meal, with skim milk at disposal. *For pigs of 60-100 lb.*—(3) $1\frac{1}{2}$ lb. maize meal per gallon of skim milk; (4) a mixture of half maize meal, one-quarter bran, and one-quarter gluten meal, with skim milk at disposal. *For pigs of 100-180 lb.*—2 lb. maize meal per gallon of skim milk; (6) a mixture of two-thirds maize meal, one-sixth bran, and one-sixth gluten meal, with skim milk at disposal. *For pigs 2-6 months' old.*—(7) maize meal, 3-5 lb. per head per day, with lucerne forage or pasture.

DENMARK:—(1) Shorts, 2 parts; ground barley, 2 parts; maize meal, 1 part; skim milk. (2) Ground barley, 2 parts; wheat bran, 1 part; ground rye, 1 part; skim milk. (3) Ground barley, 2 parts; ground oats, 1 part; maize meal, 1 part; skim milk.—GERMANY:—(1) Ground barley, 1 part; ground rye, 1 part; maize meal, 1 part. (2) Ground barley, 2 parts; ground wheat, 1 part; ground rye, 1 part. (3) Ground barley, 1 part; maize meal, 1 part; cooked potatoes and a little skim milk towards the end of fattening.

Suffolks for Cross-Breeding.

In a recent issue of the *Nor-West Farmer* (Canada), a correspondent sings the praises of the Suffolk stallion for cross-breeding. He says:—"I do not think there is a better heavy horse than the Suffolk in the world for crossing on all types of mares. To-day we find the leading breeders in England and Ireland crossing their pure-bred Shires, Clydes, Hackneys, and Thoroughbred mares with Suffolk stallions. The same Suffolk stallions have travelled the same districts in Ireland for sixteen years and others over ten years. This illustrates that the cross is all right, as otherwise I doubt very much whether a stallion could travel one season, let alone sixteen, in a country like Ireland, which is noted for its horsemen. The Irish breeders say, 'The use of the Suffolk horse with the small light mares of the south of Ireland has been found to impart strength and substance to their progeny, without impairing their powers of endurance and tough constitutions. The results of this cross are kind workers equal to a ton weight in draught on country roads, and can trot

10 miles an hour in harness.' For a second cross I would recommend a Suffolk for the heavy fillies, any that had a dash of thoroughbred on their dam's side. I would breed back to a good thoroughbred, and thus follow the example of the Irish and Australian breeders, who have proved beyond a doubt that this second cross produces more heavyweight-carrying hunters than any other combination. As regards weight of stallion for this class of mares, I would advise one of the lighter ones, say between 1,700 lb. and 1,800 lb."

Plucking Fowls.

Mr. Ernest Cobb, writing in the *Feathered World*, has some advice to offer on the subject of plucking fowls. First, it may be remarked that he favours breaking the bird's neck in preference to sticking the fowls in the head or throat, screwing the neck, or chopping off the head. Apart from the question of humanity, he prefers this method because, in his opinion, "If the bird is required for home consumption, a bled fowl will eat dry, and not one-quarter so juicy or so well flavoured generally as one that has not been bled." Coming to the subject of plucking, directly the neck of the fowl is broken, he says, commence plucking off the feathers with the right hand, whilst still holding the legs, tail, and wings in the left one, in order to prevent the bird from flapping its wings about. There is no cruelty about this, for surgeons are unanimously of opinion that when once the spinal cord is broken there is no further feeling in the body. The disconnection of the body from the brain prevents any feeling in the former. The head is now simply hanging on to the body by the skin of the neck, the end of the neck being one or two inches away from the head. The reason for commencing the plucking as soon as the bird is killed is that the feathers come away ten times easier directly after killing than if the bird is left alone for one minute only before starting to pluck.

Rare Profits from Sows.

Mr. J. S. McFadzean, the Dairy Supervisor of the Victoria Department of Agriculture, gives, in the June number of the Departmental Journal, an interesting instance of hereditary fecundity in pigs. As he remarks, prolificacy of production is a most desirable quality in all utility stock, and as this trait is largely hereditary it is from highly productive stock that breeding animals should be chosen.

The facts in connection with the instance referred to are as follows:—Mr. J. Williams, Warburton-road, Seville, has a breeding sow, a grade Berkshire, which farrowed 101 pigs within four years and reared 91 of them. A young sow was purchased from him by Mr. John Smith, Avon,

East Warburton. This sow had her first litter of eight pigs on 10th September, 1908. These, when fit, were sold as baconers for £20 0s. 1d. Concentrated food, such as bran, pollard, and biscuit refuse, was purchased for them to the value of £6 6s. 9d., and on this was also fattened a 260-lb. pig that was killed and cured on the farm. A second litter of ten was farrowed on 25th April, 1909. Nine of these were sold for £18 9s. 6d., and one weighing 121 lbs. was killed for home use. Feed to the further cost of £6 6s. was used in growing these. The sow had a third litter of fifteen on 28th August. Of these ten were well grown when seen on 3rd February, 1910, and two had been sold for £3 9s. 2d. This sow, therefore, farrowed 30 strong pigs within twelve months, seventeen of which were sold at a profit of £23 9s. 2d. Besides this, she paid for the raising of the household supply of 380 lbs. of pork and bacon, and her second year's work begins with twelve young ones to sell against eight of the previous year. "With such breeding stock as this, and reasonable care, pigs can be made a very profitable side issue on the dairy farm."

Pumping Liquid Manure.

In *Hoard's Dairyman* a description is given of a simple device for getting liquid manure out of a cistern. A 3-in. galvanised iron bilge pump with leather valves and a leather sucker is used. This style of pump will handle such solid matter as may wash into the cistern without tending full width or tread of wagon, or wider if desired. Regulate the which tank may be used for any kind of vehicle, with spreading pipe extending full width or tread of wagon, or wider if desired. Regulate the amount to be put on the ground by the valve. The plug valve is the easiest kind of valve to clean should it become clogged. With an outfit of this kind two men can pump and distribute 30 gallons of liquid manure in about two hours. Take the pump out of the cistern when not in use and wash it out.

Wheat Manuring Experiments.

Mr. W. J. Lamont, Assistant to the Government Agriculturist at the Cape, publishes in the July issue of the *Cape Agricultural Journal* the results of experiments which have been made in the manuring of wheat in the Caledon district of Cape Colony, and he thus summarises the conclusions to which the experiments seem to point:—(1) That a dressing of Superphosphate or Basic Slag alone yields an increased crop and a substantial profit; (2) That Nitrate of Soda has no effect when used alone or as a top dressing, at least in the quantity used; (3) That it (Nitrate of Soda) has little effect when used in combination; (4) That Sulphate of Potash has not made any appreciable difference in the yield; (5) That a further test with combinations in different quantities is neces-

sary to establish a normal treatment. In fact, an experiment or series of experiments must be conducted to find the true normal. This can only be done by resorting to the full experiment, which includes four experiments, "Single Ingredients," "Omission," "Finding the Normal," and "One and one half and double normal." The past season was anything but normal, and these results may only be looked upon as an interim report, which will doubtless be revised at a later date.

Dips for Pigs.

The Editor of the *Journal* of the Jamaica Agricultural Society has had his attention drawn to the question of the use of bath or dips for pigs as a sanitary measure for the protection of the animal against disease. In a letter on the subject, Messrs. Parke, Davis & Co. remark:—This idea was brought to our attention by Prof. J. H. Shepard, of the South Dakota Agricultural College. Professor Shepard has a herd of thoroughbred (purebred we presume is meant.—Ed., *Jamaica Journal*) Duroc Jerseys, and he has, so he reports, kept them entirely free from disease by using one of these hog-wallows

We believe (the writers continue) that the proper use of a hog-wallow in which is placed a disinfectant of dip, would be the means of stopping numerous contagious diseases among hogs, and, moreover, would be the greatest preventive of the spread of hog-cholera that has been discovered. When they have used this wallow once or twice, the hogs are no longer troubled with lice or vermin, and instinct prompts them to bathe daily. This keeps them clean and healthy and is a benefit to the skin. If they drink a little of the solution, it is not injurious to them: on the contrary, it is quite a protection against intestinal worms. When you consider how greatly swine would be benefited thereby, and that a farmer can construct one of these hog-wallows at the small expense of about \$2.80 for cement, it seems as if every hog-raiser should have one. Just as a man must have his water bath, the hen her dust baths, so the pig must have its mud bath. The roll in the wet earth is as refreshing and cooling and healthy to the pigs as a plunge bath to the human. It cleans the pig's skin from scurf and parasites, and leaves it healthy—only it must not be a filthy mud wallow but a clean one. Where pigs are confined to small pens, it is an advantage to provide clean water and add disinfectants to it for the pigs to have their wash.

Influence of Laotlo Acid on Cheddar Cheese.

In a bulletin issued under the auspices of the Bureau of Animal Industry of the United States Department of Agriculture (No. 123), Mr.

C. F. Doane, the Assistant Dairyman of the Dairy Division, gives the results of experiments conducted by his Division on the influence of lactic acid on the quality of cheese of the Cheddar type. His conclusions are as follows:—(1) In the process of making Cheddar cheese a too high development of whey acid injures the flavour as well as the texture of the curd. (2) The development of acid in the matted curd overcomes gas and bad taints and does not injure the flavour and texture. (3) Cheese with high acid should be put into cold storage as early as possible to minimise the bad effect of the acid.

Roots and Maize Silage for Lambs.

The Iowa State College of Agriculture has issued a bulletin (No. 110), containing the results of three years' experimental work on the economic importance of roots and maize silage for fattening of lambs. The following conclusions are arrived at as a result of the experiments:—(1) Succulent feed in the ration for fattening lambs had the effect of increasing their appetite for grain, although it decreased the amount of hay consumed. (2) The lambs never ate more than 2 pounds of silage daily per head when getting a full feed of maize. Five to 6 pounds of beet or mangels were eaten under similar conditions. (3) The dry fed lambs made slow gains at first, but later gains were much more rapid, comparing quite favourably, in the last months with the gains put on with mangels and beets, and surpassing those made with other succulent feeds. (4) In each of the three years the lambs getting sugar beets made the largest total gain and matured more quickly than any of the other lambs. They also carried a better bloom and finish. (5) Sugar beets and mangels favoured the formation of renal calculi, or stones in the kidneys and bladder, with the possibility of an obstructed urethra and consequent fatal results to rams long fed on these feeds.

(6) So far as finish was concerned all the rations produced market topping lambs so that the value of the feeds to the shepherd depended more on the rate and economy of the gains they produced. (7) The amount of dry matter required for each 100 pounds gain was highest for the lots getting turnips and cabbage, and lowest for those getting mangels and sugar beets. Silage and dry feed occupied an intermediate position. In one case the advantage was with silage and in another with dry feed. (8) The lambs fed succulent feed suffered a shrink of from 1 to 4 pounds per head more than the dry fed lambs in shipping to Chicago. (9) Financially, dry feed produced more economical gains than roots of any kind when corn was at ordinary prices. During the first year, when maize and silage were low in price, silage gave the cheapest gains, with dry feed second.

Commercial Motors for South Africa.

MR. DEANE'S VISIT TO ENGLAND.

INSPECTION OF MOTOR WORKS.

IN our English contemporary, *The Commercial Motor*, for 2nd June, appears an interesting article by "A Member of the Editorial Staff," descriptive of Mr. Deane's tour of the leading commercial motor works in England. The writer of the article accompanied Mr. Deane in a consultative capacity, and, as what he has to say regarding the results of the tour will be found of particular interest by readers of the *Agricultural Journal*, we make no apology for reproducing the whole of the article herewith.

It was my pleasure (he writes), during the whole of last week, to accompany the Hon. W. A. Deane, Minister of Agriculture for Natal, in a consultative capacity, on a tour of inspection embracing a number of representative British works, and also to witness demonstrations with different types of commercial vehicles and tractors. In consequence of the alarming rate of mortality amongst the cattle of his Colony, as a direct result of the ravages of the "tick," Mr. Deane's Government decided to replace the transport oxen by some mechanical means for the transportation of the mealies and wattle bark, which constitute so large a proportion of the produce of Natal's agricultural districts. During the past three years a very large number of cattle has been lost by the dreaded disease, for which no cure has yet been discovered, notwithstanding the handsome reward which now awaits the man who obtains a serum, or in any other manner effects the control or eradication of the disease.

The services of the consulting department of *The Commercial Motor* were invited by the Agent-General for Natal. We—the Editor and I—after most careful consideration of all the conditions which would have to be met, and the purpose for which the Department of Agriculture intends first to apply mechanical means of goods transit, agreed that, for immediate employment in the Colony, tractors are preferable to self-contained vehicles, and, with but one small exception, we have advised Mr. Deane to confine his present purchases to machines of the former class. Good progress is being made with road-making in Natal, and many of the gradients are already metalled, but it will be some years before the country will be ripe for the general employment of self-contained motor wagons capable of taking up to five tons, although numerous sections of road suitable for special services of motor vehicles will, it is hoped, be completed within the next few years. Mr. Deane predicts

an enormous sale for all kinds of motors which prove suitable for the country, whether for work on the roads or on the land. Farmers must have facilities for goods transit, and, with their stock reduced by half within three years, and still further losses occurring as the result of a disastrous disease, they are ready—and even eager—to be convinced that mechanical transport can remove many of their troubles, whilst the Natal Government, consisting of practical and far-seeing men, is ever ready to assist farmers in the purchase of approved types of machines for agricultural or transport purposes. The Government departments, too, will make increasing use of motor vehicles and tractors. Home manufacturers would do well to seek an early opportunity to become better acquainted with the Colony's requirements, and to produce machines which may readily be adapted to the local conditions. Many motors have, from time to time, been tried in Natal, but they have generally failed to do the work required, except within small areas, and on paved roads. Mr. Deane is, none the less, a confirmed believer in the future of commercial motors for his country, and the object of his visit was the purchase of suitable machines to form the nucleus of a very large fleet of self-propelled vehicles and tractors; his purchases during the tour included two paraffin tractors, four steam tractors, and one superheated-steam, convertible, passenger-and-mails or goods wagon. In addition to the purchase of these seven machines, Mr. Deane has also expended about £18,000 on steam-ploughing tackle.

The tour was made in a 40-h.p. six-cylinder Napier landaulet, the passengers therein being the Minister of Agriculture, Mr. Francis Harrison (the Commercial Agent for Natal) and myself, and the selected route lay successively through Luton, Bedford, Gainsborough, Leeds, York, Lincoln, Peterborough and Baldock, the journey both starting from and finishing at the St. Ermin's Hotel, Victoria Street, S.W. Two point-to-point journeys were subsequently made; one of these was to Rochester, for the dual purpose of examining the exhibits at the Bath and West and Southern Counties Show and of visiting the works of Aveling & Porter, Ltd.; the other to see some tests with a Hampshire maker's machine. Mr. Deane's time was strictly limited, or he would have been pleased to extend his tour so as to include the works of many other well-known steam-wagon and petrol-wagon and tractor builders.

Mr. H. G. Humby, the Natal Government's Consulting Engineer in London, during part of the tour, gave the Minister of Agriculture the benefit of his extensive experience with locomotives and ploughing engines.

Few, if any, of the standard models of British makers are suitable for South African employment, the conditions of which are so very different from anything we have in this country, except it be for military

purposes. Makers should, therefore, take a note of the following points, which are but a few of the special requirements for motors intended for Natal: the clearance from the ground of any part of the chassis except the wheels should be not less than 18 inches; the road wheels should be made of steel, not of wood; the wheels should be not less than 4 feet in diameter, and for goods wagons, should be shod with renewable steel stropes, but, for passenger vehicles, solid-rubber, band-section tires with an all-metal expanding attachment, similar to the device made by Shrewsbury and Challiner, may be used; speeds not to exceed six or eight miles an hour for goods vehicles, and 12 or 15 miles an hour for passenger motors; the engine must be designed to consume paraffin, or crude alcohol made from sugar residuals; the mechanism must be protected from dust; the whole construction should be both simple and strong; self-contained wagons, for employment when the quality of the roads has improved so as to permit of their use, should have large goods space and be capable of taking from three to four tons on their own platform and hauling a bullock wagon with an additional three tons of useful load up a gradient of one in ten on a soft road; tractors should be capable of hauling not less than two loaded bullock wagons, each of three tons capacity, up the same gradient, and their gross weight should not greatly exceed seven tons; all wagons and tractors should be provided with winding drums and cable, and spring drawbars or drawbar brackets should be fitted; the wheels should be made as wide as possible, say not less than 12 inches, with extension flanges for tractor wheels so as to bring up the total width, during the wet season, to 18 inches; spuds and spikes should always be carried on the machine, and, of course, provision must be made for their attachment to the wheels.

Some of the demonstrations which were given during the tour, with standard English machines, were of a most convincing nature, and they showed that a few of our Home builders are alive to the requirements of Colonial buyers. One of these demonstrations was made in the yard of the Wellington Foundry, Lincoln, when one of Foster's tractors was put to a series of tests. A pit about 30 inches deep was dug in the centre, with steep sloping approaches, and, through this pit, the tractor hauled a load of nearly nine tons with perfect ease. The pit was then filled in with loose earth and rubbish, and the train again driven through it. A third test was made, this time with two loaded trailers, a total of 15 tons behind the drawbar, which load the tractor hauled with ease along the level, and nearly through the pit; the hind wheels of the second trailer, however, sank so far into the loose earth that the winding drum was required to haul the trailers clear of the pit. All the tests were made without the use of spuds or spikes, both of which would be permissible in Natal, and Mr. Deane stated that the machines would not be expected

to work under such unfavourable conditions on arrival in South Africa. During the tests, the Foster tractor consumed soft coal of very inferior quality, such as is obtainable in South Africa.

The question of mechanical transport is, for Natal, and, indeed, every part of South Africa, an all-important one. Outlying places and districts which are distant from the railways, if they are to advance, must have suitable means for their produce to be taken into the markets, or to the nearest railway station. The effecting of such improvements, within the means of Natal, requires that provision be made from year to year, by the granting of a sufficient sum annually, such monies to be specially earmarked for the permanent improvement of the roads, and for the purchase of rolling stock to work thereon. The Government of which Mr. Deane is a member has initiated that policy, and Natalians will see that it is continued. Will British motor manufacturers awake to South Africa's needs, or will they leave it to the business men of Germany and the United States of America? At present, the Home builder has the sympathetic co-operation of his kinsmen in South Africa, and particularly in Natal, but there is a limit to a Colonial's tolerance, and, if the Home manufacturer will not make an effort to produce what is required, and to demonstrate his machine in the Colonies, he cannot blame anybody but himself if orders are placed with the enterprising men of other countries who send out machines for demonstration purposes, and send with them men who know the machines from A to Z, and have real "grit" and life about them.

Sluits: Their Prevention and Cure.

By MAX BERGIL.

A Paper read before the Venterstad Farmers' Association, C.C.

THE subject which I have chosen is certainly one of the biggest and best important amongst the many difficult and complicated questions which the farmer has to contend with in this sub-continent of ours, and when I presume to give a reading on sluicing I do not forget it for a moment, and I do not wish you or anyone else to go away with the impression that I am able to treat the subject as it should be treated.

I also wish to add further that a certain amount of what I am putting before you to-day has already appeared in print in some form or another, and some of you may possibly accuse me of not giving you original matter. My answer to that is that I am not giving this reading

as my knowledge, but for the purpose of stirring up interest in the subject, which is of the most vital interest to South Africa generally and to us in particular; and as long as I can succeed in attaining that object I shall be perfectly satisfied, knowing that my reading has been of some practical use. I dare say you are all aware that the erosion of the soil, or the washing of sluits, is looked upon by most thinking men, both practical farmers as well as others, as one of the greatest national calamities in this country. It is one of the South African questions which leave those men tearing their hair out, when they think about it. But are we all thinking men?

And it is for the purpose of bringing forward questions like this one that our Association exists, that people will get the opportunity of hearing such questions discussed and so getting their minds broadened.

Gentlemen, it is in the nature of things that the human being, with few exceptions, does not worry himself much about anything—until such a thing begins to cause him some inconvenience—a person hardly knows that he wears a boot until it starts pinching him—and, of course, the farmer is no exception. There are so many difficulties to be combatted that he has not got the time to tackle everything until sometimes the danger is so great that only a miracle seems able to save the situation.

Well, gentlemen, I do not think that dangers of sluicing are so great that the farmer has to wait for a miracle, but I think that the danger is so serious that we must use all the means in our power to stir the farmer and the country generally up so that the seriousness of the situation may be fully realised by all, that we may know that the enemy is at our door.

Because I tell you as surely as the sun is going to rise to-morrow morning, just as surely is that enemy (sluicing) going to drive you from your beautiful farms if you do not tackle the question at once. If we once get this thoroughly drummed into our heads, then we will.

What is, then, that great danger of sluicing that is so terrible that I have to compare it with an enemy. There may be some present who may think that I am using such words just to say something. I tell you "No." I say, were I a silver-tongued orator, I could not use words sufficiently eloquent and earnest to bring home to you the seriousness of the dangers resulting from sluicing.

No one who is not acquainted with the facts, or who has not taken notice when he travelled through the country of the evil done by sluits, can form any idea to what an extent it has become a national question.

It is simply fearful in some districts, chiefly near the hills and at the foot of the mountains, where millions of tons of soil are washed away with every flood. Where is it taken to?—to another part of the farm? No! Pretty straight to the sea, never to be returned. And what about

the places after the soil has been so removed? These become unlovely spots—a source of danger to man and stock. This is not only the case in one or two isolated cases, but in hundreds and thousands of cases. In all these cases, where a short thirty or forty years ago there were beautiful vleis, where the grass grew so high and dense that one could hardly see game or cattle, there is nothing now but deep and ugly sluits. There are many old people alive who will say, when you converse with them about different farms: “Do you know this or that spruit?”—with its hundreds of similar sluits running into it, eating into the soil in all directions, taking up hundreds of morgen perhaps. “Well, when I was a young man, it was a beautiful vlei, with no sign of a sluit about it, and many is the time I raced across it after game, with loose reins.” What is it good for now, I ask?

Gentlemen, we stand in the middle of a strong current, and there is no time to shout advice: we must be up and doing if we wish to save ourselves.

And please don't think that there will be an improvement with better times or more rain: there is no such thing: every day that is delayed the danger will be so much greater. Now, Mr. Chairman, I shall not be surprised if there are some who will say, “Well, possibly there is some truth in what he is telling us, but what can we do: we have our hands so full with other matters, plagues, etc. How can we find the time or the means to fight the evils of sluiting?” To such I will say, in what condition did you receive that farm about 30 or 40 years ago, and if you do not do something, in what state will it be when your son, when the next generation, will get it? Have we not a duty to carry out towards our children and posterity? Our statesmen do so much, and how far do we second their efforts?

Sometimes we may have the right to say: Well, seeing I am personally concerned in the matter, it does not matter to anyone else what I do, but when the future generations are concerned in it, we dare not take up such a position. We must guard against the possibility of the future generations cursing their ancestors.

But there is another point of view of the case that I wish to put to you, and that is that the preventing of sluiting is a direct benefit to every farmer. If we see a horse or beast belonging to us sick, do we not make every endeavour to cure it, knowing that it represents so much L.S.D. to us, and why shouldn't we do the same thing for the great mother of all our stock. That beautiful farm that looks so lovely when it is covered with its natural vegetation, and which has to feed all our stock. To look after and cure the sickness of the mother of the stock is surely of much more direct benefit to us than the curing of a single animal.

And I tell you this serious illness of sluicing can be cured. The most stupid can satisfy himself on the point as easily as the smartest. We don't require to wait for an expert to show us how it is to be done.

In order to make this paper of some practical use I will endeavour to give you the cases of sluicing and the steps taken to remedy or to prevent the forming of sluits.

In the first place, I consider that overstocking is one of the greatest causes. When there is too much stock on a farm, the natural vegetation gets tramped out so that when the rains which we know generally come in the form of thunderstorms fall, the water, instead of soaking in, runs off, and so forms the beginning of a sluit.

Then, again, the going to and from the water of stock, this causes the stock to make footpaths along which the water runs, forming in the course of a few years deep, dry sluits. All this sudden running off of the water constitutes a double evil. Firstly, there is the forming of sluits with which we are dealing to-day, and secondly, the drying up of our veld. Instead of the water soaking in and saturating the soil everywhere, it runs off, causing the fountains to get weaker and the veld to get drier.

Now, as to the remedies. It is a very easy and inexpensive work to get smaller sluits filled up by throwing dams, either of stones or earth, across these sluits. Some begin the work near the bottom and work up to the top, and others begin at the top and work down. For the purpose of stopping the erosion the latter is accepted by the best authorities as the better course, and is the one to be recommended.

Then there is the fencing of farms with jackal-proof fencing. This is rather more expensive, but if people would only recognise how necessary it is and try it, I believe they would find that it is cheap in the end. By having your farm fenced in this way you will always have your sheep in good condition, your wool will be a better price, no herds, etc.

Of course there are many sluits of such magnitude that it will be quite impossible for a private individual to cope with it, and for those cases I think Parliament should do something. There is a further suggestion that I thought might be worth thinking about, and that is that the Government should be asked to contribute something either on the £ for £ principle or otherwise, and let the various Divisional Councils offer a couple of prizes annually to the men who have done the best work in the way of preventing or filling up sluits during a certain given period. This to remain in operation for a couple of years until the seriousness of the subject has been thoroughly brought home to everyone.

Several of the members gave their opinions, among whom was Mr. Geldenhuis, who said that he advised commencing at the top, because the first bank would stop the length of the sluit being increased, then go on and find where the water flows into the sluit again and throw another

bank across. If this were done and the farms enclosed with jackal-proof fencing and small stock allowed to run free, sluits would in time disappear.

Mr. R. E. Anderson proposed a vote of thanks to the Chairman, which was carried unanimously.

Mr. P. M. Southey will read a paper on Merino Sheep at the next meeting, which will be held on the 6th of August.

East Coast Fever.

GENERAL BOTHA'S POLICY.

THE following memorandum has been drawn up by the Minister of Agriculture (General Botha), and issued to the press, as embodying the policy which he has decided to adopt in dealing with East Coast Fever in the Province of Natal:—

1. To restrict the movement of cattle as far as possible throughout the Province. With this end in view an order has already been issued prohibiting all movement of cattle in the Province for six months from the 1st of September, 1910, with the exception of those required for immediate slaughter for the supply of meat for consumption in the Province.

(2) To discourage traffic to and from infected farms by natives and others.

(3) To clear infected areas of cattle until such time as all infected ticks thereon shall have died.

This work can only be carried out gradually, of course, and a commencement will be made with isolated outbreaks on the outskirts of large infected areas, or on areas which have become partially clean, or are only slightly infected.

(4) To fence infected and suspected farms and locations, and to encourage the fencing of all farms and locations.

(5) To arrange, as far as possible, for the branding of all cattle, whether belonging to Europeans or natives, in districts in which the disease exists, and for the counting of the cattle in those districts at regular intervals.

(6) To allow no cattle to be moved without a permit.

(7) To discourage speculation in slaughter cattle by butchers and others, and to strictly supervise all movements of cattle intended for slaughter.

(8) To enforce the immediate reporting of all deaths of cattle from any cause whatsoever, and the taking and forwarding of blood smears to the Bacteriological Laboratory.

Legislation will be introduced during the first session of the Union Parliament to strengthen the hands of the Government in this respect.

Seeing that the control of the disease will, to a great extent, be a matter of administration, I have arranged with the Minister of Justice and the Minister of Native Affairs for such officers of their departments as may be located in the country districts to co-operate with the Agricultural Department in dealing with the disease; and in order to ensure the necessary supervision and the smooth and effective working of any measures that may be taken to cope with the disease, it is proposed to hold the Magistrates responsible for the conduct of the campaign against the disease within their districts.

These officers, who will be advised and assisted by the Veterinary Surgeons, will be able to acquaint the Government of the conditions of affairs as regards the disease within their districts, and to make certain that no risky permits are granted for the purchase or movement of cattle, and that the regulations are observed. Further, by virtue of their position, and of the influence they possess with the European farmers and natives, they will be able to explain the necessity of the various measures adopted, and induce them to co-operate with the Government in carrying them out.

In order to ensure the requisite expert advice and assistance steps are being taken to increase the veterinary staff, and the Ministers of Justice and of Native Affairs have kindly undertaken to do their best to furnish such aid as may be required from their departments.

The Police are being instructed to work with the Magistrates and to do their utmost to assist the local authorities in their efforts to cope with the disease.

I am strongly in favour of systematic dipping of cattle, and of branding and fencing, both as a means of controlling the disease and of assisting stock farmers; and I hope that, whether disease be present or not, farmers will do their best to press on with these operations.

The above is merely a general outline of the policy which it is proposed to adopt in respect to East Coast Fever, but it will be understood that modifications will probably be required from time to time, particularly in details, as increased knowledge and experience suggest, or the exigencies of the situation demand.

I fully recognise the extreme gravity of the situation caused by the spread of the disease in the Province of Natal, but am of opinion that, provided farmers and others co-operate with the Government in exercising the utmost vigilance in respect to stringently enforcing the measures suggested, it will be possible not only to arrest the spread of the disease but to gradually exterminate it.

South African Wool from a Buyer or Manufacturer's Point of View.

By W. F. EARLE.

(Of Messrs. Ebell & Co., Wool Buyers, Durban.)

*A lecture delivered in Bloemfontein on the 13th April, 1910, on the invitation of the Free State Authorities.**

IN his opening remarks, Mr. Earle stated that the subject of his talk that evening would be Merino wool, that being the type mostly grown throughout South Africa, and explained that what he had to tell his audience would chiefly be from the point of view of the buyer or manufacturer, as he was not a grower. His firm, in common with other coast firms of buyers, were the representatives of the actual users of the wool. They, in fact, bought and shipped direct to the factory, and he therefore spoke from experience gained during many years through seeing the actual results of the wool after it had gone through the machines. In other words, he would ask them to look at the question, not merely from a local standpoint, but to take into consideration what was the sole determining factor, *viz.*, the value to the manufacturers at Home, who, their supplies from every quarter of the globe. Mr. Earle, continuing, said: it must be borne in mind, were, after all, the final arbiters, and who drew

Firstly, we will take the properties that go to make a desirable merino wool from a user's point of view, and for which they are prepared to pay most money.

The Judges' Association, as you know, have adopted a scale of points for the judging of wool, with which I am fairly in agreement. Taken in the order of their importance, the different properties are as follows:—

	Points.
Actual Yield	25
Evenness and Quality	20
Soundness	15
Length of Staple	10
Elasticity	10
Spinning and Felting Properties	10
Kindness in Handling	5
Colour	5

Making a Total Maximum of 100

* This Article is to appear in the pamphlet, which Messrs. Reid & Acutt's Wool Mart Ltd. are preparing, and to which we make reference in a footnote to Mr. McCall's Article appearing elsewhere in this *Issue*. As stated there, we are enabled to publish these two Articles by the courtesy of the Managing Director and the Secretary of the Wool Mart in furnishing us with advance proofs.—Ed.

The merino wool giving the greatest number of points under this table would therefore be the most valuable, but I will go a little more fully into these qualities in the same order.

EXAMINATION OF POINT VALUES.

Actual Yield (25 points).—You will observe that out of 100 points, no less than 25 are allotted under this head, and rightly so, as there is no doubt that yield, or condition, *i.e.*, freedom from fatty yolk, earthy and vegetable matter, etc., in fact, the greatest amount of clean scoured wool when ready for the manufacturer—is by far the chief factor affecting the price to be paid for wool in the grease. It is a point, however, not very well understood by many growers, but I can bring it home to them by stating that every 5 per cent. of yield makes a difference of over a penny per pound in the value of the grease wool, all other qualities being equal. The great bulk of Free State wools will lose over 58 per cent., and some even up to 80 per cent. in scouring; that is, 100-lbs. weight of greasy wool will only give from 20 to 42-lbs. of clean scoured material. These are proved facts, and not mere guesswork. You may see this matter of yield illustrated in certain of the samples on view, where you have wool of practically equal length and quality ranging from 5½d. to 9½d., and even 12½d. per lb. in the grease, solely on account of the difference in condition. In fact, the 5½d. wool would be worth 12½d. if as clean as the latter parcel.

Evenness and Quality (20 points).—For wool even throughout of high quality and fineness, and true fibre.

Soundness. (15 points).—This refers to the staple of the wool, *i.e.*, a cluster of fibres, which should be able to stand a reasonable strain, and is a very valuable property, especially in long or “combing” wools, and it also shows that the sheep must have been kept in good condition and health during the period of growth.

Length of Staple (10 points).—For a twelve months’ growth, the greater the length the better. A well-grown merino combing wool may be even up to four inches in length as a twelve months’ growth.

Elasticity (10 points).—This implies that a wool will stretch and spring back to its original length, and the greater the elasticity the stronger the wool, and the finer.

Spinning and Felling Qualities (10 points).—These refer to several qualities, such as pliability (an important feature in spinning), crimp or waviness, health and silkiness.

Kindness of Handling (5 points).—Wool should be soft and kind to the feel, a sign of high quality.

Colour (5 points).—That is, brightness in appearance, in contrast with dull and dingy wool. Colour is affected by the soil and climatic conditions, etc.

Quality.—Before proceeding further, I should like to point out that the word “quality” as applied to wool, does not mean fineness alone, as is sometimes believed, but refers to all properties such as soundness, character, evenness, elasticity, pliability, fineness for its breed, crimpy structure, colour and softness.

FINENESS IN WOOL.

Fineness in wool means the diameter of each single fibre, and, other things being equal, the finer the wool, the greater its value in the “top” or in the clean pound. Fineness, however, is perhaps of less value to-day than in years gone by, because the great improvements in machinery have enabled manufacturers to turn out very attractive material from the more robust classes of wool. Still, all the same, fineness is an important factor in making for a good price, and it may interest you to hear something under this head. In the wool-trade on the Continent of Europe, the various degrees of fineness are mainly indicated by letters, such as “a,” “b,” “c,” etc., but in England, it is customary to use numbers. To take the combing trade, for instance, for which long wools are mostly used, I will first explain that “combing” is the first stage in the manufacture of long wool, and is the making of wool into “top,” etc., which is done by very fine steel teeth, which comb the wool, leaving the best in the “top,” similar to the samples shown you, and combing out all the short, weak stuff, second cuts, and vegetable matter, like the samples of “noil.” There is also a certain quantity of other waste matter, such as tar or other brands. From the “top” the spinner spins his yarn or thread, and the best results are naturally obtained where evenness of quality, length and soundness are most in evidence.

Soundness, in long wools especially, is a very important point, and where you have soundness, you have also certain other qualities. Returning, however, to degrees of fineness, you will have seen in the papers occasional quotations for 60’s tops. Well, ordinary 60’s is the quality from which merino wool starts; anything below 60’s, say 56’s, being crossbred, 58’s being the dividing line between fine crossbreds and merino. The great bulk of merinos are covered by the qualities running from 60’s to 90’s, and in South Africa from 60’s to 74’s. I will explain to you the meaning of these figures. “60’s” means that one pound weight of “top” of that quality will spin 60 hands of thread, each thread being 560 yards long. Therefore, one pound weight of 60’s “top” will spin a thread of about 33,600 yards, or between 19 and 20 miles long, while a pound of the finest and best “top” will spin several miles longer. South African merino wools range from ordinary 60’s to 74’s in quality, and there is a distinct margin in the value between the two qualities. As already stated, the vast range in the value of wools in the grease is mainly due to the *Difference in Yield* of the wool in scouring. There are also other

causes, such as the degree of freedom or otherwise from grass seeds, burrs, double cuts, tenderness of staple and other drawbacks, which diminish the quantity or the quality of the "top," and increase the proportion of "noil" and other less valuable out-sortings. It should, therefore, be the endeavour of every grower of wool to produce a sound, well-grown, dense fleece of good character, as free from fault as possible, and reasonably light in the grease.

Density.—With a dense, or close fleece, there is also much less chance of earthy matter getting into the wool; in fact, the grower should aim at producing as much good, sound, dense wool as possible per sheep, with as much fineness as conditions will allow.

HIGH PRICES.

We have heard a good deal lately about the high prices obtained per pound for special Australian clips, and growers in South Africa have been urged to produce similar wool. But, even in Australia, these very high priced clips are only grown in certain districts and under suitable conditions as to climate, soil, districts, rainfall, etc., and there is a vast body of Australian wool of only medium fineness or even robust in quality, also of less light condition, which may still give as good a return to the flockmaster as the finer grades. Indeed, it is not the price per pound that tells of success or failure, but rather the money return per sheep. I can illustrate this by two instances that came to my notice on the Durban Wool Sales this last season. One grower with a fine and light conditioned clip averaged six pounds per fleece and made 12d. per lb. all round (including skirts) or equal to 6s. per sheep. The other grower averaged nine pounds per fleece with a less fine and light, but also well-grown wool, and he made 8d. per lb., or also 6s. per sheep. Now, although the grower who made 12d. per lb., no doubt would boast of the result, and hold his head higher than one who only made 8d., yet can anyone say he really did better? No: the money returned per sheep is the safest criterion, and it is a pity more statistics are not available on this point, which I recommend to your Agricultural Department.

Climate and Soil, etc.—It is certain that climate, soil, situation, etc., have much to do with the production of wool, and very frequently farms adjoining each other produce wools of quite different growth and condition. Every farmer must use his own intelligence in deciding on the type of sheep most suitable to his particular circumstances, but he must use intelligence, always aiming, however, to get as near as he can to the best of this type.

Improving South African Wools.—No doubt, much can be done to improve the wool of South Africa, such as importing good new blood, etc., but we hear far too little of one method being practised, viz., the annual weeding-out from the flock of the old worn-out and inferior

sheep. This is imperative if a first-class flock is to be built up, and a high quality clip produced. My advice to you is to give your best attention to producing a fleece of good combing length, as dense (or close) as possible.

Yolk or Fat.—Though a certain amount of yolk is right enough, I am dead against breeds producing excessively greasy wool. The production of too much fatty matter takes it out of the constitution of the animal, as has been proved in Australia, and eventually the percentage of lambs seriously decreases. Fatty breeds may give a heavy fleece, but its value is low, as the buyer will only pay on the clean pound basis.

PREPARATION FOR MARKET.

Classing, Skirting, etc.—We now come to the question of classing and skirting, and general preparation for market. I have frequently during the last few years expressed myself as against over classing, and the making of too many sorts, especially with the small clips usually grown in South Africa, and have always suggested making four, or at most five sorts, except perhaps in the case of larger clips. I would advise making, say, one sort of combing of full twelve months' (in some cases possibly two), one sort of clothing, or short-grown and tender fleeces: one sort to include bellies and skirts: one sort locks. Coarse and black fleeces, if any, should certainly be kept separate, and perhaps any very greasy rams' fleeces (*especially Stud Rams*). But, in the majority of cases, four to five classes will be sufficient. Yet I have seen clips totalling only 25 to 30 bales classed and skirted into well over a dozen different sorts. Such a refinement is expensive and unnecessary, and undoubtedly depreciates the value by making the lots too small and unimportant.

Classers.—If I may be allowed to give a word or two of advice to classers, it is that they should not only avoid making too many sorts, but also refrain from giving valuations to the grower, because unless the classer has a thorough knowledge of yield, and, moreover, is in intimate touch at the time, by cable, with the market values at Home of the "top" and "noil," it is impossible for him to make more than a rough guess at the value of the wool as it lies on the farm, and he runs the risk of disappointing the grower and placing himself in an invidious position. Growers should also realise that they are expecting too much of the classer under the circumstances.

Damp Wool.—I need not go further into this question except to strongly urge upon growers that wool should never be shorn and packed unless in dry condition. Nothing puts a buyer off more than a damp clip, as not only does it lose in weight, but the wool itself deteriorates and loses colour.

Brands.—With regard to brands, "tar," and other sorts, it does not

appear as if any mixture has yet been discovered which will thoroughly scour out, and therefore it is best to clip off the tips with the brands on. The grower thereby improves his wool and only loses the tips. Shearers can be employed doing this on wet days during the shearing period or at other odd times.

DOES IT PAY TO CLASS AND SKIRT?

Finally, in this connection there arises the frequent question, "*Does it Pay to Class and Skirt?*" My answer to this is, "*Yes, provided the work is properly and carefully done.*" It must be admitted, however, that there are some clips so poor and ill-grown that it seems hopeless to expect a classer to make anything of them. But any decently grown wool should pay to skirt, although a big all-round advance in value must not be expected. If even a small average increase in price is gained, sufficient to cover the extra labour and a little over, it is all that should be looked for at first, although in course of time, as the reputation of the wool improved, no doubt something extra might reasonably be expected.

Burrs.—It is regrettable that of late years there has been a considerable increase of "burry" wools in this country, which is a matter that should be carefully enquired into. I have myself seen shipments of sheep coming in from Australia with fleeces smothered with burrs, and in this way the evil is undoubtedly spread: this, however, is a matter for the Government to take up.

Markets.—Finally, a word as to markets and the realisation of wool. I notice, that by means of the public press and telegraphic agencies there is a constant and determined attempt being made to persuade farmers, either singly or through various associations, to ship their clips to Europe and to pass by the Colonial markets. It would, I think, be well for farmers, before lending themselves to such schemes, to make sure that they would really benefit by the change. To any farmer or society having the idea that they can do better by shipping the wool themselves, I say at once, by all means try it, but, let it be a fair trial. First, offer the produce on this side of the water, then, if not contented with the bids, ship and compare the results. If, after a trial of shipping, growers find they have done no better than by selling locally, then I take it they will prefer to sell in the country they live in, and keep the wool-trade and its benefits here rather than drive it abroad. I am quite certain the Colonial markets are not afraid of the result of such comparisons. It may be said by growers, "If buyers out here can make a profit by shipping, why cannot we?" Well, buyers on this side, at any rate in the Coast ports, are, in the main, representatives of the users of the wool, and it is bought and shipped by them direct to the factory, thus saving largely in expenses. The aim of the grower should be to produce a first-class article, got up in decent style, and he will not need

to worry about looking for buyers: they will be only too keen about looking for him. Moreover, when the wool is sold on this side, sellers are sure of the competition of buyers representing the consumers of the world, English, French, German, American, etc., etc., but when the wool is once shipped, growers must consign it to some particular market, and then have to take the price that market will give, even if at the time of the sale it does not happen to be a good one, since to warehouse for a future sale or re-ship elsewhere runs up too many extra charges. It has sometimes been claimed in favour of shipping to London (and I saw this argument in one of the local papers quite recently) that there the wool is seen by the leading experts of the world. Let me tell you that the best judges of South African wools are in South Africa, not in London, or anywhere else. The reason for this is that in South Africa the buyers (who have had just as good training in the mills as any Home men), possess, in addition, the great experience gained through handling far more South African wool than the London buyers, to say nothing of the advantage of seeing the result of the wool after passing through the machines. The South African buyer also gains a large local knowledge of the wool from each particular district.

Where do you think the principal buyers of South African wools are? Take, for example, the districts shipping through the port of Durban. Do you think they are likely to be in London, where only about 5,000 bales of these wools are sold yearly, or in Durban where from 80,000 to 100,000 bales are annually catalogued? If a manufacturer wants South African wool, he naturally sends his orders to one of the South African markets, where his agent has by far the largest selection to choose from.

According to the *Rhodesian Agricultural Journal*, the total number of farmers in Southern Rhodesia is 1,470. The district of Mazoe contains most, with 132. One district (Sebungwe) has one farmer only. Chibi has 2 and Gutu 4. The total for Matabeleland is 990 and for Mashonaland 480.

DESTRUCTION OF THE TICK BIRD.—A Proclamation has been issued by His Excellency the Governor-General suspending the operation of the Natal Law No. 33, 1896, in regard to the bird known as *Buphaga erythrorhyncha*—the Tick Bird (red beak) or *Ihlalanyati*. The provisions of this Proclamation extend to the whole of the Province of Natal.

The Living Bee.

By MARY RITCHIE,

President, Natal Bee-Keepers' Association; Natal Expert, South African Bee-Keepers' Association.

(Continued from Page 92.)

PART II.

A BEE EXPEDITION.

THE bee-girls were radiant. The class is one of the most enthusiastic in the College, but to-day its members had made a discovery. Root, Cowan, Cheshire and Maeterlinck they had read and enjoyed, but a biographical sketch of the late Dr. Dzierzon in a current magazine had supplied a date which had enabled them to orient themselves in their favourite study as nothing else had done. Though apparently incredible it appeared that Dr. Dzierzon, the founder of scientific bee-keeping in Europe (Dr. Dzierzon was the first to use movable combs and so make possible the easy examination of the hive), died less than three short years ago; indeed, he must have been contemporary with Langstroth, and Langstroth is often spoken of as the Father of Modern Bee-keeping. They were thus at the very beginning as it were of modern apiculture, and that too in a new country with millions of unhived bees and enormous honey yields waiting to be harvested. Small wonder that each should rejoice and already feel herself a pioneer.

Another complaint! The landlord sighed, for the cottage had only been let a month, and already the roof had been repaired, the windows barred and the front door made to shut. This time it was the bees, the tenant said, they had been troublesome from the first. The landlord sighed because he hated complaints; then, remembering the bee-class, he wrote at once. We promised our first free Saturday and counted the days.

Saturday at last. The morning is magnificent. The sun shines brightly, the clouds have disappeared. It is just the time of year too to be a whole day out of doors, either on the hills or in the woods. A bee expedition is almost better than a picnic; it is a picnic with a purpose, a thread with a knot. Veils are tastefully adjusted over hats, ready to be pulled down when required. They are green—a pale delicate shade for the novices; the plain dark ones, more useful if less picturesque, have all been “under fire.”

There is a short train journey and a long walk, but the few rain-drops of last night have laid the dust, and the day is one for the open road. The village of the bees is a quiet up-country village, planted with orchards and shady trees. The house is on the slope of the hill—an old-fashioned single storey building—so clad with creepers, it is difficult to see the wood and iron underneath.

The lady of the house meets us at the gate. She explains that when her husband was stung (he put his boot on hurriedly, but not so hurriedly as he took it off again) she merely laughed; but when a bee stung her the next day when she was ironing, she complained to the landlord. The great advantage, she says, of merely renting a house, is that when anything goes wrong, one can complain to the landlord. Perhaps the green veils are somewhat alarming, more disturbing almost than the bees. It is obvious that she is nervous. There is a suggestion of postponing the attack, but the class knows no pause. A fire brigade at the scene of operations stays not to discuss, but quickly goes to work. The smoker works bravely; a box, a chair, a ladder all appear on the verandah as if by magic. The kitchen boy has been electrified into action; he has never before been known to hurry.

The old house is a patient in the hands of the physician, after a series of rapid pokes and punches the trouble is located. Rap, rap, rap, tap, tap, tap, a few bees hurry out to see what is happening, a few more to remonstrate, a crowd to declare it is insufferable, more and more, till the whole air buzzes with them. The tenant's nervousness grows and increases, not that she cares for herself, he assures us, but her husband!

None of the Kafirs will go near the bees it appears, not even Songo-lollo, the stable boy. We have no sooner started operations, however, than he offers his assistance, and with hammer and chisel sets about removing the iron in quite a business-like manner. The space behind the first sheet is empty, the second is promising, the next reveals a magnificent sheet of honeycomb hanging from the cross beam just over our heads down almost to the ground, covered with thousands of soft brown quivering bees.

It would be easy now to kill and scatter and destroy, and how many times in Natal bees are ruthlessly scattered and destroyed. The landlord would be satisfied and the tenant pleased. Her husband's temper would remain unruffled, and her ironing proceed uninterruptedly. But what of the possible labour of these fiery insects, what of the honey they might make for us, could we but guide their industry aright? No, they must be hived and taken care of, studied and understood.

Never were muscles so rapidly developed. Sandow might be jealous did he see our arms, and our hands after the manipulation are like those of a baby giant, huge, but dimpled, like an infant's. Yet, no one would

miss the fun, though the stings were twice as bad. Songolollo accompanies us to the station, and stands proudly on the platform, gently fanning the hive with a syringa bough, against stray bees, until the train arrives. Our fellow-passengers are somewhat nervous, but the journey is short and uneventful.

Half an hour before sunset, a glowing sky in the West and a cluster of green veils under the wattle trees. All eyes are on the ground; the bees are being hived.

"What soft brown velvet masses—let me feel them!" "And me!" "And me!"

"How lovely—don't fight now, be good."

"They are not fighting, only talking—see!"

"What—the Queen?"

"Yet, that long shining beautiful bee, with the slow majestic walk—now she has gone in."

"Oh, look how they are following, like a regiment of soldiers!" "Like sheep going into a kraal," says the girl from the country. "No, the hive is the Town Hall," explains the town girl, "and there is a big concert on. Be quick, be quick, little bees, or you will not get a seat."

"Nay, it is magic music this, such as the Pied Piper played. She is their mother. Hear how she calls them, and with what a joyous sound they follow, happy and content because she is there, with their new home under the wattle trees."

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

By MISS A. C. PULLINGER,
Hon. Secretary, The Apiary, Malvern.

It is with regret I have to inform members that at a recent meeting of the committee of the N.B.K.A. held in Maritzburg, Mr. W. C. Mitchell, through pressure of other business, said he found it necessary to resign the secretaryship of the Association, asking that I be elected, and so acting in conjunction with Mr. Mitchell as hon. treasurer, the work of the Association will now be divided until such time as other arrangements may be made. In any case I feel sure that all members are most grateful to our late secretary for what he has done for the Association, for it must undoubtedly have taken up a lot of his spare time, and it has only been through Mr. Mitchell's untiring zeal since he took over the

secretaryship that the N.B.K.A. can at the present time boast of quite a large membership roll. Mr. D. W. Kellar has been elected to the committee. I hope that members will assist me to make the "Bee Pages" in this *Journal* as interesting and instructive as possible by sending in for publication articles on bee-keeping, posting same to me not later than the 12th of the month. I hope the report below on honey exhibited will be of some future assistance to those members contemplating competing another year.

At the Durban Show last week Miss Sillar (who judged on the honey section) gave a lecture and demonstration on bees in a tent on the Show Ground. Quite a large crowd of people gathered and evinced much interest in the proceedings, and, judging by the many questions asked, it is surprising to what a large number of people the habits and life of the honey bee are unknown. The bees behaved very well until we took the queen out, when all was excitement, of course. No one was stung, however, and I hope that another year bee-keepers, and especially those wishing to become bee-keepers, will have the opportunity of witnessing such another demonstration with live bees, for it is likely to engender confidence in the timid, and goes far towards teaching beginners the first elements of a most scientific subject. Commercial bee-keeping is a different thing; we must, however, combine the two if we would be successful bee-keepers.

Honey at the Maritzburg Show.

JUDGES' REPORT.

THE following is the judges' report on the honey exhibited at the "Royal" Show:—

It has been a great pleasure and of much interest to us to act as judges at the Agricultural Show held in Maritzburg on the 16th, 17th and 18th June. On entering the large and tastefully arranged Produce Hall, we were most agreeably surprised to find quite a large display of honey, light, amber and dark extracted honey presenting a most pleasing colour-scheme. A scarcity of comb honey was noticeable, undoubtedly attributable to the recent poor season which from all accounts prevailed in most localities, but we hope that another year we shall see comb honey more in evidence, also an improvement in the manner of staging. Honey placed directly on the show-bench with the jars in contact with each other loses much of its true value in colour, for those jars standing in front of others gives the uninitiated the misleading impression that honey of different kinds is being shown in one class. Two exhibitors had used glass, forming shelves with the jars; the general effect thus

produced was a great improvement, and showed the honey off to much greater advantage. This is, however, an expensive manner of staging which might very well be replaced by light white enamelled stands, which would answer the purpose equally well. This question of staging, however, we are pleased to hear, is to be discussed by the sub-committee, and so there is no doubt that a happy decision will be arrived at before the show season comes round again.

Now for that which will, I have no doubt, prove of most interest to those members who did so much towards furthering the interests of bee-keeping and the production of honey in this country—the exhibitors—a report on the judging. In Class I. the competition was keen, Mr. F. Shippey's exhibit taking first prize. The staging of this display of bee-keepers' appliances was much to be commented upon, several large and up-to-date appliances being shown. Feeders were simple and easy of manipulation, the Danzenbaker bottom board feeders being most in evidence. There was much to be desired in the hives shown both in Mr. Shippey's and Messrs. Steel, Murray & Co.'s exhibits. These were imperfectly put together, the respective parts not being nailed true. Messrs. Steel, Murray & Co.'s hive was not complete, for it lacked the tightening cleats for frames in the broad body, also foundation and wire in the frames. The small observatory hives in this exhibit were up to date and serviceable, but the shutters protecting the glasses fit too tightly, also the foundation in the sections had been cut and put in the wrong way of the cells. To return to Mr. Shippey's exhibit, it was noticed that the roof of the Danzenbaker hive shown overlapped very considerably at the sides. This would undoubtedly allow of water penetrating at the top. The greatest drawback to the Danzenbaker roof is the difficulty of keeping all dry within.

In Class II. was shown an appliance for brushing bees from off both sides of a comb at one time, by placing the appliance in position above the frames (whilst in the hive) to be manipulated, which is then drawn up and through the two brushes. Such a means of clearing combs of bees may be of interest and use to those bee-keepers who have plenty of time to spare, but for rapid, practical work no such appliance would be of much advantage. The idea is good, and perhaps some of our members will try this method of brushing off bees, and report results. From personal experience, however, I have found that one quick jerk of the frame directly over the space from which it was taken is sufficient to dislodge almost every bee and is all that is necessary. An extractor was shown in this class and was very creditable, apart from the fact that the escape tap was so small that it would readily become clogged with accumulated cappings, also the bottom did not allow of the honey running quickly to the outlet. The cages could not be reversed without stopping

the machine. There was nothing new or original in the extractor although well and strongly made.

Class III.—There were five entries in this class, Mrs. E. Talbot easily taking first prize for some beautiful wax, excellent in colour and quality; a fine product suitably staged.

Mrs. Keytel's exhibit was also of good quality and colour.

Wax exhibited by the Experimental Farm, Cedara, was given preference over the other exhibits on account of its more pliable quality and fineness in texture.

The remaining two exhibits were of poor colour and quality, very hard, but there was evidence of much care having been expended in getting the wax clean and free from all foreign particles. Altogether, this class was fairly well represented and most creditable, but we hope to see a lot more entries another year.

Class V.—Comb honey in sections. Here we find only three exhibits, Mrs. Keytel taking first prize for a dozen glazed and laced sections containing light-coloured thick honey, capping white and even, the sections well filled; altogether a most pleasing exhibit. Here I would like to impress upon members the advisability of showing all honey under glass. I hope the sub-committee will take the matter in hand, including it in the Association rules for future reference. Comb honey thus exhibited is shown to far greater advantage, and in every way adds much to the general appearance of the show-bench. Grooved sections may be purchased, for which only are necessary the correct size of glasses, which are easily slipped into place and the sections secured by a couple of small tacks. This is quickly done and is far less trouble than fixing the glasses in place by means of strips of cloth. Of the other two exhibits the one had evidently been made up of sections taken from various hives in the apiary, for in some the honey was light, whereas others contained quite dark honey, and yet again there were sections in which the cells had been filled with different kinds of honey. The sealing of the sections naturally varied in the same manner, most of it being rough and very yellow in appearance, whilst some looked transparent and thin, which manner of capping I have found to burst very easily in weather at all moist and hot, also granulating more quickly in cold weather. What is wanted is even opaque sealing, perfectly white and even (smooth) in appearance. The third and last exhibit was comprised of only eight sections, four having been broken during transit. These sections were beautiful in appearance (apart from their stickyness) being well filled, capping white and even, but the flavour of the honey! Well, really, it was nauseous; there is no other word to describe the taste of it. It would be interesting to know from what source the bees gathered the nectar, for there is little doubt that if the particular plant

which the bees evidently visited exists abunds to any great extent, the nectar thus obtained would spoil the flavour of other honey coming in at the same time, and so the chances of securing pure flavoured honey at that time would be impossible. I wonder whether the exhibitor of the sections in question lives in a locality where aloes abound in large numbers, for honey obtained from these is known to possess a bitter, objectionable flavour. Comb honey is a very fragile commodity, and so requires most careful packing. The only safe way is to first pack the sections closely together in a light box which is put inside a larger one, this smaller box to be supported on quite a dozen or more springs. Comb honey thus packed will travel any distance without any fear of the least damage being sustained.

Now we come to Class VI., in which, although there are three entries, there is but one exhibit; this by Mrs. Keytel. The frames had been well filled and sealing good; honey slightly mixed. General appearance would have been much improved by glazing and the honey raised above the table in such manner that each frame might be seen without undue handling.

Class VII. was well represented in the catalogue by 13 entries, but there was not this number of exhibits. However, the display of this class (extracted) honey was most creditable, and, from an educational point of view, very instructive, for the reason that honey could be seen in various grades of colouring, ranging from water white to very dark, thereby discrediting the fallacy of the uninitiated that pure honey (or that the best honey) should always be of a light colour. In time I have no doubt that the general public will recognise the fact that dark coloured honey may be equally as good in every respect as the lighter kinds. In my opinion amber coloured honey usually possesses the most delightful aroma and flavour, being superior in this respect to the majority of the very light coloured honeys. The competition in this class was keen, only the most careful sampling, and consequent on the giving of points for density, flavour, colour, etc., made it possible to come to a mutual decision as to the awards given, but not in one instance did the judges feel justified in giving full points for flavour, for much was to be desired in this respect. For show purposes I would suggest extracting individually from a number of the best honey-producing colonies in the yard, and then from these separate extractings select the finest and purest (not mixed) flavoured honey. Apart from the general flavour, the actual quality of the honey in this class was all that could be desired; the honey taken all round was found to possess far greater density than honey obtained from the Coast. Exhibitors should bear in mind, however, that one pound jars are required; one member, having staged half pound jars, lost all chance of securing a prize. On account of the

different coloured honey staged, it was found necessary to divide it into three distinct classes, *i.e.*, light, amber, and dark, thereby giving more members a chance for competition, apart from the fact that it would have proved next to impossible to judge honey of such different grades as one class. Altogether the display of extracted honey was very good indeed, and needed but a better and more effective manner of staging to show it off to the greatest advantage.

We now come to Class VIII., which is again represented by only three exhibitors out of eight entries. Mrs. E. Talbot gained first prize for some pale yellow, finely granulated honey of good flavour. Another exhibit of lighter colour, coarser granules, and flavour not so good, was awarded second prize. The remaining exhibit, although of good colour, possessed a most objectionable flavour; also, there was noticeable on the surface of the honey a hard crust of fine granules, occasioned undoubtedly by air bubbles crystallising after too rapid filling of the jars.

Class IX.—One entry, an exhibit by Mr. Fuller. Undoubtedly a working hive of bees, in which without handling the frames it would be impossible to locate the queen. In the super, empty sections had been placed between the shallow frames, *etc.*, *etc.* (In an observatory working bee hive one naturally does not expect to see the queen, but my co-judge is perfectly correct in regard to shallow frames and empty sections being placed in supers. No bee-keeper would ever think of using both in one super. And no apiarist would ever dream of using empty sections. The unicomb, or two stories hive, with one frame above the other, are the proper hives to see the queen.—R.H.P.)

Class X.—One exhibit by Mrs. Keytel, which was certainly very well staged, and the light coloured honey looked exceedingly well on the glass shelves so tastefully arranged, but (there are always buts) the colour scheme was a little monotonous. Some dark, also a few bottles of granulated honey, together with more variety in the size and shape of jars, would have been a great improvement. Great effect can be secured by the use of tall narrow bottles; also a touch of colour, according to the bee-keeper's taste, may be shown by the use of narrow ribbon for "dressing" the jars. This will relieve the monotony of the general colouring of the honey and wax and also shows the display up to far greater effect. Mrs. Keytel's exhibit, however, was a decided advance on that of last year which it was my pleasure to see at the Durban Show, and so each year we hope to see greater things, always striving to do our very best to reach perfection on the show bench, as also in all other matters pertaining to our beloved industry, bee-keeping.

I cannot close this report without some reference to a most interesting educational exhibit by Miss Johnson, of Roodekop, two volumes of drawings from nature of wild flowers growing on the high veld. The

many different wild flowers are here depicted in their rare beauty of colour and form. Some dainty feathery specimens of nature, others of gorgeous bulbous growing plants, a combination of wild nature in her happiest mood. The blossoms had been most carefully thought out and equally well drawn, being exact copies of the living models. Glancing through the pages it was evident to the bee-keepers present that with but few exceptions all the wild flowers of the Transvaal are accessible to the honey bee in search of nectar. Miss Johnson is to be highly congratulated on her very excellent representation of the "Wild Flowers of the High Veld."

A. E. PULLINGER,

R. H. PEPWORTH,

Judges..

Bees and Fruit Fertilisation.

By R. BETHUNE,

President of the Victorian Apiarists' Association.

A Paper read at the Annual Conference of Fruit-growers, Bendigo, 1909.

THE blossom of fruit trees consists of the calyx or cup, the sepals or short green leaves which cover the bud before it opens, and the petals of various shades of white and pink, inside which are the stamens carrying the anthers or male organs producing that extremely fine fertilising powder called pollen. The stamens, of which there are many in each flower, surround the pistil: in the case of the blossom of stone fruit there is one: in apples, pears, etc., there are five pistils. The upper part of the pistil or female organ, is the stigma, with a duct or passage leading down into the base of the pistil. To produce a fruit it is necessary for a pollen grain to reach the stigma. Pollen grains, though small, are of ornamental appearance, and complex in structure, consisting of an outer and inner covering, the latter enclosing a jelly-like protoplasm containing nitrogen and other chemical matter. Lodged on the stigma, the pollen grain absorbs moisture, swells, and throws out a tube, which grows down the pistil till it reaches the unimpregnated nucleus in the ovule, which is situated in the ovary at the base of the pistil. Thus fertilisation takes place. In the case of an apple blossom there have to be five distinct fertilisations corresponding to the five divisions of the core, while with the blossom of strawberries, raspberries,

and others over one hundred fertilisations are required. If any of the pisils fail to receive pollen a deformed fruit results—an apple depressed on one side or berries showing hard, green undeveloped places on the ripe fruit. If an apple so deformed is cut crosswise no pips will be found in the section underlying the undeveloped part, and such apples usually fall before reaching maturity. It is therefore important that a pollen grain should reach each stigma, and that pollen grain should come, not from the anthers of the same flower, but preferably from a flower on another plant of the same species.

According to Darwin, the cross fertilisation of flowers is the most important factor in the continued vitality of any species of plant. In double sex flowers, such as those of fruit trees, self-fertilisation is possible. Nature, however, provides devices and conditions to avoid it. The stigma of some flowers does not become receptive till the anthers on the same blossom have shed their pollen, and therefore pollen from elsewhere has to reach the stigma. Some varieties of fruit, such as the Bartlett pear, cannot produce fruit without the pollen of some other variety. Cucumbers, melons, pumpkins, and similar plants have separate male and female flowers, and in all these instances some agency is necessary to bring the pollen from the anthers of one blossom to the stigma of another. Wind is one of the agents, but the principal ones are insects, and amongst them the most important is the bee. Fertilisation by air currents would probably produce barely sufficient fruit to prevent the extinction of the species, but as in the service of man a hen is expected to lay more eggs than she could hatch, and a colony of bees to produce more honey than is sufficient for its needs, so a fruit tree is expected to yield more than sufficient for its propagation, and for the profitable culture of fruits the agency of insects is needed in the fertilisation of the bloom.

The honey bee is not only the most important factor in pollination, but the one insect which by structure, the nature of its food requirements and its habits, is best adapted for the purpose. It obtains its food, nectar and pollen from the blossoms of plants. The nectar obtained from the blossom under the influence of a secretion from glands in the anatomy of the bee is changed into the honey as found in the combs of the hive. Nature provides the nectar in the flower to attract the bee. To get at the nectar the bee has to pass over the anthers, and the pollen grains adhere to the many hairs covering its body; in visiting the next flower some of this pollen falls on the stigma, and thus fertilises the blossom, even if the bee is not gathering pollen. In gathering pollen it sweeps together the pollen grains with its moistened tongue, nips it off the tongue with the front pair of legs, passes it on to the second pair of legs, and finally on to the third pair, where it lodges on what is called the pollen

basket, a covering of stiff hair below the upper joint. In this performance pollen grains become scattered all over the body of the bee, and as it has to visit many blossoms before it gets the amount it can carry, and passes over the stigma of every flower, pollination is always brought about. If the bee visited the blossoms of different species of plants in the same excursion, there could be no cross fertilisation, because strawberry pollen, for instance, could not fertilise peach blossom. It is, however, a well known fact that a bee during each trip confines itself to one species of plant, whether in search of nectar or pollen, and a mixture of pollen is never found in any bee's load as it enters the hive. Plants of the same species, but of different varieties, are, however, worked over on the same trip, and it is largely due to this that seedling fruit trees seldom come true to name, and that there are occasionally crosses of various vegetables.

In America, the importance of bees in fertilising flowers is fully recognised. In the large greenhouses near Boston, where early cucumbers are grown, one or two hives of bees are always inside to pollinate the blossoms, otherwise there would be no cucumbers unless men went round with brushes to carry the pollen from blossom to blossom. At Marengo, in Illinois, lives one of the foremost beekeepers of the United States. All round his apiary great quantities of cucumbers are grown for pickling purposes. They are picked when 2 to 3 inches long, and sold to the pickle factory. To grow cucumbers profitably, it is necessary that the greatest possible amount of fruit should set on each vine. At the time of my visit there were 600 acres of cucumbers grown in the neighbourhood of the apiary, and while Dr. Miller's bees greatly benefited by the supply of pollen and honey thus provided, the success of cucumber growing is at the same time in a large measure due to the presence of a large apiary.

The fruit-growers of many States, when planting orchards in new and isolated places, found that their orchards yielded unprofitable crops where no bees existed in the locality. When this fact was discovered, and a few colonies of bees were established in or near the orchard, the yields of fruit became normal. Americans specialise in nearly every kind of rural production, and it is a very common practice for a fruit grower to plant a large orchard of one variety only. In the case of at least one variety of pear, the Bartlett or Williams's Bon Chretien, and some varieties of apples and plums, it was found that even when bees were kept these varieties proved barren unless some other variety of the same species existed in or near the orchard, the reason being that the varieties referred to could not be fertilised by their own pollen.

The blossom of the grape vine requires more than many others the agency of insects for pollination. Mr. F. de Castella, Government Viti-

culturist, informed me a short time ago that, during his recent visit to Europe, he found, in certain districts of Sprain, the pollination of grapes, owing to the absence of insects, was done by hand.

I will now give some well-known authorities in support of the statements made. Professor A. J. Cook, formerly of Michigan Agricultural College, and now of Pomona, California, who has paid particular attention to the fertilisation of fruit by bees, writing to Mr. Hopkins, Government Apiarist of New Zealand, says:—"Bees never harm blossom, but are always a help. Bees are a tremendous aid through pollination. Many of our best fruits must be cross fertilised to produce. Many pears, apples and plums are utterly sterile to their own pollen. I am sure that it is an incontrovertible fact that bees are the great agents in pollination, and are far more valuable to the world than for the honey they produce."

The best orchardists in California now arrange with apiarists to bring their bees to the orchards; they find they must have the bees. Professor Waite, of the United States Department of Agriculture, covered the blossoms of apples, pears and plums with netting, excluding the bees, and found that the protected blossoms of many varieties yielded no fruit. In some varieties there was no exception to this rule, and he was convinced that large orchards of Bartlett pears, planted distant from other varieties, would be utterly barren were it not for the work of the bees, and even then they could not be profitably grown unless every third or fourth row was planted with Clapp's Favourite or some other variety capable of fertilising the Bartlett. In other words, the Bartlett pear could no more fertilise its own bloom than the crescent strawberry. Professor V. H. Lowe, of Geneva Experimental Station, New York State, covered a set of small pear trees with hoods of fine gauze, the lower end of the bag-like hood being tied to the trunk of the tree to exclude insects. On all these trees was a large number of buds, and all conditions favourable to a good crop, except that the flight of insects was entirely cut off. The result was that, out of the whole of the trees covered, there was just one fruit, whereas on another set of trees of the same sort not covered, there was a good crop, proportionate to the size of the trees. Many more similar experiments could be given, but I think enough has been said that bees are very necessary to fruit-growing; but, of course, it is not necessary to keep them in an orchard if there are bees kept anywhere in the locality to be within reach of a bee's flight, and I think there are not many localities without bees. Still it is, in my opinion, an open question whether in some localities, and under unfavourable conditions of weather, the setting of fruit would not be improved if more bees were kept. In my personal experience, I have always been on the safe side, as I usually have more hives than fruit trees. I have never had occasion to complain of poor setting of fruit; on the contrary, I always have to

do a lot of thinning out. While I have shown the great value of bees in the fertilisation of fruit, I do not deny that there are some instances of antagonism between fruit-growing and bee-keeping. These instances are, on the one side, the spraying of fruit trees with poisonous compounds while the tree is in full bloom, and, on the other side, the damage or apparent damage done by bees to ripe fruit.

In regard to the spraying of fruit trees while in bloom, I am not sure whether the practice is at all general in Victoria. I have heard of only one or two instances of bees being poisoned by spraying, and none have come under my personal observation. The practice of spraying trees in full bloom has been abandoned in America, because not only was it found no more effective than spraying before or after, but it actually reduced the fruit crop by destroying the pollen and the delicate organisms of the stigma of the blossom. I am aware that in orchards where varieties are grown which bloom at different periods, it would interfere with straight ahead work to spray the different varieties separately. Still, I would ask orchardists to avoid spraying trees in bloom as far as possible, for the sake of their own interests and for the sake of the industrious insect which is of so much value to horticulture, while it is to the bee-keeper his means of living.

Dealing now with the least pleasant item of my paper, that of damage to fruit by bees, it is well known that at intervals of years, corresponding with years of dearth of nectar, bees are accused of damaging ripe fruit. That bees, under stress of circumstances, extract the juice of fruit the skin of which has been broken by birds, insects other than bees, or wet weather I do not deny, but I absolutely deny that bees ever harm sound fruit. Bees will actually starve to death with a bunch of grapes or any other kind of fruit right inside the hive if all other food is out of reach. I do not claim this as a virtue for bees. It is an impossibility for them to puncture fruit. Numerous experiments have proved this fact. When bees gather the juice of damaged fruit it is when no nectar is available, and I have always advised bee-keepers to feed their bees near or inside the hive at such times, not so much to keep them away from fruit, but to prevent the fruit juices being gathered and consumed by the bees, as they are quite unsuitable for bee food, and very detrimental to the health of the bees. In my own experience bees have once in a while gathered the juice of grapes and plums which had small round holes pierced through the skin by that mischievous little bird known as the silver eye.

In conclusion, I would again ask you, in performing the operations of your occupation, to bear in mind the value of the bee to your industry, and, in return for the services it renders you, to extend to it a sympathetic consideration, which will at the same time benefit the industry I represent—that of apiculture.

THE FARMER BOYS' PAGES.

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS
FOR
BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Conducted by "ARATOR."

** * Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.O. Editor, "Natal Agricultural Journal," Maritzburg.*

Nature Notes for August.

(By M. R.)

- 1 August—Baby leaf-buds on the mulberries.
- 3 " Frogs' first concert.
- 3 " Crickets' first concert.
- 14 " New leaves after the rain.
- 15 " Syringa trees in leaf.
- 15 " Bud-scales unfolding on the fig trees.
- 15 " Catkins on the fir trees.
- 21 " Little pink lily flower. (Plate 54 "Natal Plants.")
- 21 " Orange blossom opening.
- 21 " Virginian creeper in leaf-bud.
- 23 " Swallows select building site.
- 24 " Kafir-boom pods opening.
- 24 " (Wattle blossom out up-country.)
- 24 " Day flower out. (Plate 48 "Natal Planter" Commelina.)
- 27 " Red lilies out in the garden.
- 29 " Professional ants.
- 29 " Fire-lily.
- 30 " Bees swarmed.
- 31 " Michaelmas daisies (Aster asper.)

It is August. The grass where it was burnt has come up again brighter and greener than before, starred with yellow crocuses, the first of the spring wild flowers.

Seedlings and buds wait for the rain. One day is broody, full of promise, but the next the sky is cloudless, the atmosphere clear as a

crystal bell. At last, after weeks of waiting, the bamboos creak fitfully, and there is trouble among the leaves.

"Whispering, musical, pattering clear, earthward cometh the rain," no sunny shower, but a three days' downpour till every tank is full and every thirsting rootlet satisfied. Silent before, everything awakens to newness of life. The rain-clouds have gone; piled up into soft, white masses they lie along the horizon, leaving the sky a peerless blue.

The birds, thinking of mates, are whistling and calling to each other in the bush, or re-arranging the old question of boundaries. The wag-tails possess from the field of Kafir corn to the pond that they may build their nests undisturbed among the reeds, the tick-birds from the syringas to the paddock, the rain-bird keeps the clump of bush by the sluit, while the honey-suckers hold the garden, from the bamboo hedge to the india-rubber tree.

The lizards dart silently into the sunshine. The frogs croak in the marsh as though the world was theirs and theirs alone. The crickets whirr almost as loudly in the drier grass. Beneath all comes the tiny hum of insect life, for many a golden chrysalid is empty and the still world stirs with the joy of its new-found life. Now, all our fairy tales come true, Nature is the Sleeping Beauty, the Rain the Prince that sets her free.

M. R

Fruit Culture.

SOME CHATS FOR BEGINNERS.—IV.

By "POMUS."

As we saw in our last article, desirable kinds of fruit trees which cannot be propagated with any degree of reliability by seed, may be propagated by three other methods, namely, by cuttings, by layering, and by budding and grafting. (I place budding and grafting together under one category as they are the same principle.) I have described how propagation by cuttings and by layering is done, and we have now to discuss

BUDDING AND GRAFTING.

We have seen that in propagating any kind of fruit other than by sowing the seed, a bud is always taken as the basis of the operation, and then the question arises as to how the bud chosen can best be fed with

plant food so that it may develop into a strong, healthy shoot. A bud as it stands is unable to continue growth if severed from the stem on which it is growing. We may therefore cut off several inches of the stem to which the bud is attached and plant this cutting in the ground. The sap which the cutting contains will probably keep the bud alive until roots have been developed which will begin to extract nourishment from the soil for the use of the bud. Or, again, instead of severing the stem on which the bud is growing from the parent tree we may bend that stem over and bury a portion of it in the soil, leaving the bud projecting above the surface of the ground: by this method the bud obtains its nourishment from the parent until such time as the stem on which it is growing has thrown out roots of its own from the portion of it which is buried. These two methods are known, as we have already seen, as the cutting and layering method respectively. Now, however, we make another advance by taking a bud with very little wood and bark attached from the tree which it is desired to propagate and affix this bud to a stem on a tree of a less desirable kind. In making a selection of a tree on which to grow such a bud, we must remember that the more closely the two trees are allied (the desirable tree from which the bud has been taken and the common tree to which it is to be affixed) the greater will be the chances of a successful union of the bud with the tree on which it is attempted to grow it. "Varieties of the same species," says an authority, "unite most freely, then species of the same genus, then genera of the same natural order; beyond which the power does not extend. For instance, pears work freely upon pears, very well on quinces, less successfully on apples or thorns, and not at all upon plums and cherries; while the lilac will take on the ash, and the olive on the Phillyrea, because they are plants of the same natural Order." In "The American Fruit Culturist" it is remarked, however, that there are some exceptions to this rule. "Thus the cultivated cherry, and most species of wild cherries, though of the same genus, will not agree. The pear succeeds better on the quince than on the apple, although the apple and pear are within the same genus, and the pear and quince are by most regarded as of distinct genera; the superior firmness of the wood of the quince, a quality so important to successful grafting, more than compensates the difference in affinity." These remarks refer to grafting as well as to budding, for, as I remarked above, the principle is the same in budding and grafting, namely, the bud from the tree to be propagated is brought into what may be termed growing contact with the stem or branches of a commoner kind of tree. The difference is that in budding a bud only is taken and attached to the tree, whereas in grafting the bud is cut with a certain amount of stem attached, which stem is then affixed in one of various ways to the tree which is to act as its foster-parent.

The tree which it is desired to propagate and from which the bud or cutting is taken, is known as the "scion"; whilst the tree to which the bud or cutting is to be attached is known as the "stock." Where a bud is cut with a portion of stem attached, the cutting is known as the graft; and both bud (alone) and graft are also referred to as scions.

HOW BUDDING IS DONE.

Budding is much easier than grafting for a beginner to perform and should not present any difficulty to any one with an ordinary amount of intelligence. It is done in the summer, and if the operation happens to fail then it is often possible to make another attempt in the same summer. Having chosen your stock, cut through the stem in a downward direction and then make a small cut at the top at right angles, thus forming the letter T. Next, go to the tree which you wish to propagate and remove a bud from a shoot of the present year's growth. To do this shave off the bark about an inch or an inch and a half in length, together with a small portion of the wood inside. Now raise the edges of the cut bark in the stock where the up cut of the T meets the cross cut. Then insert the lower end of the bud with the bark attached and push the whole down so that the two flaps of bark in the stock will cover both sides of the bud, leaving practically just the tip of the bud exposed, and, of course, a little of the bark above and below. Now, bind the whole firmly together with some soft substance and the operation is complete.

(To be continued.)

A farmer with an average-sized dairy should have at least one good brood sow or more where needed. One will usually furnish enough pigs to grow up and fatten on the farm, at least, and this means quite a saving when otherwise they would have to be purchased.

It is now well established that the hen at birth possesses the ovules of all the eggs which that bird will subsequently lay during her lifetime. It was at one time thought that the eggs were produced in the natural course as the bird advanced in age, but experiments have gone to show that this is not the case, and that at birth the bird possesses an ovarian or egg cluster in which all the eggs which she will subsequently lay are contained.

Agricultural Chemistry for Beginners.

CHAPTER X.

By ARCHIBALD PEARCE.

SILICA, IRON, MAGNESIUM, Etc.

THE preceding chapters have been occupied with those elements which play the largest part in the economy of plant life; the present one is devoted to a short description of several bodies, which, while in some degree of less importance, yet cannot altogether be passed over without notice. They are all necessary constituents of plant tissues, but usually exist in comparatively small quantity.

SILICA AND THE SILICATES.

Silica is the acid-forming oxide of a non-metallic element named silicon, and exists in nature in enormous quantities in the form of quartz, rock-crystal, etc. Most sands consist largely of grains of this substance. Its salts are called silicates, and of these the chief is the silicate of the metal aluminium, a compound we are all familiar with under the name of clay. When pure it is quite white, and is called china-clay; but in this state it is rare, being almost always mixed with a number of other compounds, to which its various colours are due. The oxides of iron colour it red or yellow, the carbonate of iron tinges it blue. Pure clay is entirely useless as a plant-food, and it is to the other substances mixed with it that our crops must look for subsistence. Especially noticeable among these is a class of silicates known as double silicates, because two bases join in forming the salt instead of one; one of these bases is always aluminium, the other may be calcium, potassium, sodium, or ammonium. The chief chemical effect of lime upon clay is to cause the formation of the double silicate of calcium and aluminium, and if this meets with any ammonia, the silicate of ammonium and aluminium is formed, the lime being set free again. This is one of the ways in which ammonia is fixed in the soil. Many plants need a supply of silica; the shiny outside coating of oat and wheat stems, for instance, consists of this oxide, and some woods are so full of it that they soon take the edge of the tools used in working them.

IRON.

Iron is a necessary constituent of all plants, although the quantity they need is very small. It is required for the development of chlorophyll, the substance which gives the green colour to the leaves and other parts of plants. Iron forms two different oxides, known as ferrous and ferric oxides (Latin *ferrum*, iron), in order to distinguish them, the ferric containing more oxygen than the ferrous. When these oxides combine with acids, we obtain two corresponding sets of salts; thus we have ferrous and ferric sulphates, ferrous and ferric chlorides, etc. The ferrous salts are mostly green in colour, the common sulphate of iron, for instance, often called green vitrol, is the ferrous sulphate; the ferric salts are red or yellow. Ferrous salts have a great tendency to take up more oxygen and become changed into ferric; hence most of the iron salts found in the soil are of the ferric variety. They often form a considerable proportion of the soil: the red clay so common in the Colony owes its colour to a high percentage of ferric oxide, and the red colour of bricks is due to the same oxide. It occasionally happens that in soils rich in this oxide it collects just below the depth touched by the plough, and forms a hard impervious layer or "pan," which has a very bad effect on the drainage of the land, and prevents the roots of the crops from striking down to a good depth. The evil results of such a pan are best avoided by drainage, and by the use of the subsoil plough. The ferrous salts, if present in any quantity, are very prejudicial to fertility; but soils in which this occurs are rare. By continued cultivation the exposure to the air converts them into ferric salts, when they become harmless. Ferrous sulphate is often used as a constituent of potato manure, as it has some effect in preventing blight; about one half cwt. per acre is the amount usually applied.

MAGNESIUM

is a metal whose salts are also required by plants in small quantity; it is found, as the carbonate, together with calcium carbonate, in many limestones, and often exists in the soil in the form of the sulphate or Epsom salts. Most soils contain sufficient to avoid the necessity of adding any further quantity in the manure.

SODIUM.

This metal much resembles potassium; its compounds are very common, ordinary table salt being the chloride, washing soda is sodium carbonate, while the soda used in cooking is the bi-carbonate. Common salt is a most widely diffused substance, traces of it being found everywhere; rain water generally contains a small quantity, probably due to

sea-spray being carried to great distances by the wind. It is essential to animal life, but deadly to plants if present in large proportion. It is occasionally applied as a manure to mangolds.

CHLORINE.

This is another example of a gas, and being of a yellowish green colour is remarkable for being visible. When it combines with another element, the resulting compound is called a chloride, and is identical with the salts formed from hydrochloric acid. A small quantity of these salts always exists in the soil, and as a minor constituent of plants.

SULPHUR.

Sulphur is a familiar yellow element, often called brimstone. It enters to some extent into the composition of various organic compounds, especially a class of nitrogenous bodies called the albumenoids. This name means "like albumen," and albumen is the name given to the white of egg, which is the best known example of the bodies referred to. Sulphur readily inflames, and in burning forms a gaseous acid oxide called sulphur dioxide, having the well-known smell of burning sulphur, and forming, with water, sulphurous acid. This dioxide can combine with a further portion of oxygen, and then becomes sulphur trioxide; this, too, is an acid oxide, and forms sulphuric acid or oil of vitrol. The salts of this acid are called sulphates, and the sulphates of calcium, magnesium, potassium and ammonium form that portion of the soil from which plants obtain the small quantity of sulphur which they need. All these sulphates have been already referred to in speaking of the bases from which they are formed. Another sulphate which is becoming of considerable importance in agricultural operations is the sulphate of copper, or bluestone, which forms the chief ingredient in Bordeaux mixture, now so largely used for spraying potatoes to prevent blight.

QUESTIONS.

1. What is the chemical name and constitution of quartz?
2. Describe the chemical action of lime upon clay.
3. What is a double silicate? Name all these you know of.
4. Explain the difference between ferrous and ferric salts, and why the latter and not the former are commonly present in soils.
5. What acids are derived from sulphur?
6. What are albumenoids?
7. Mention all the sulphates you know of.

The Principles of Manuring.

V.—FARMYARD MANURE.

FARMYARD, stable, barn, or kraal manure, as it is variously called, is the excrement from faerm animals. Since it is originally formed from vegetable matter, it naturally contains a certain percentage of all the elements of plant food required by crops. It is not surprising, therefore, that this kind of manure should be held in high esteem by farmers, but it is not used as much in this country as it is in England and on the Continent of Europe on account of the greater intensiveness of farming in those countries. Nevertheless farmers in this country recognise its value and use it whenever practicable.

But farmyard manure is not only valuable on account of the fact that it is more or less a complete manure; it is also valuable because by its decay in the soil it adds large quantities of humus, a substance which is of such great value to a soil that it has been said that the more humus a soil contains the more fertile will that soil be. Humus is of value in improving the physical condition of a soil, and it also, since it consists of organic matter, contains a considerable percentage of nitrogen and other plant food substances.

Farmyard manure is naturally very variable in composition on account of the many different vegetable substances, eaten by the animals, which may go to form it.

In studying farmyard manure, it will be convenient to consider each of the three classes of constituents into which it may be divided, viz., the solid portion, the liquid portion, and the straw or hay used as litter. The manure will, of course, vary in composition according, to some extent, to the proportion in which these three substances are present.

THE SOLID PORTION.

The value from a fertilising point of view of the solid portion of the excreta—in other words, the proportions in which nitrogen, phosphoric acid and potash are present—depends on a number of conditions. First of all, there are two factors to be considered, namely, the kind of animal (that is to say, whether it is a horse, cow, sheep, pig and so on), and, as we mentioned above, the nature of the food. This latter factor has a greater influence upon the fertilising value of the manure, since the solid portion of farmyard manure is made up of undigested food. Naturally, the manure from animals fed on poor food will not be as good as that from animals which have received a much richer diet.

Then, also, we have to consider the age and also the treatment of the animal. Young animals void manure which is not as rich in the

three fertilising substances, nitrogen, phosphoric acid, and potash, as is that yielded by older animals, because whilst it is growing it absorbs from its food larger quantities of these three fertilising substances than do adults.

The following are analyses of manure obtained from horses, cows, pigs and sheep* which we give here just as a rough guide. It must be borne in mind that the fertilising value of farmyard manure varies, and probably no two samples from different animals would be found to yield identical results upon analysis:—

			Nitrogen percent.	Phosphoric Acid. percent.	Alkalics. percent.
Horse	...	...	2'08	1'45	1'25
Cow	...	...	1'87	1'56	0'62
Pig	...	...	3'00	2'25	2'50
Sheep	...	...	1'78	1'42	0'71

These figures, of course, represent the composition of the solid portion of the manure in a dry stable, supposing that all moisture had first been driven off.

It must be remembered, however, that some animals void a greater quantity of dung than do others; for instance, the cow voids more than the horse, so that although the manure of the former animal has a smaller fertilising value, the difference is to some extent compensated by the excess in the quantity of dung per animal.

Weight for weight, the solid portion of sheep's manure is the most valuable from a fertilising point of view since it is richest in nitrogen and phosphoric acid and contains the smallest percentage of moisture.

Next month we shall study the value of the liquid portion of farmyard manure and of the litter.

(To be continued.)

Dairy Notes.

A NOISY, slow milker may ruin the best of cows.

The spirit of co-operation is one of the fundamental pillars of successful dairying.

The dairy cow must have as much wholesome nutritious food as she can digest.

Pasteurisation does not improve the quality of butter made from sour farm-skimmed milk.

Often the profits from the best cows go to make up the losses from the others.

* Calculated by Dr. Aikman from Stoeckhardt's Analyses.

When the dairy cows are putting fat on their backs, they are not putting it into the milk pail.

Feeding should always be done judiciously. To compel a cow to eat a large amount of slow digestible food is time wasted and money lost.

It is much better and cleaner not to wipe dairy utensils with a cloth, no matter how white it may be. If the cleansing water is plentiful and hot, the vessels dry much more healthfully without wiping.

Any man can milk a gentle cow, but it requires good judgment and intelligent handling to make her a profitable investment. Better discard old ideas and adapt newer methods, as they immeasurably assist in paying bills when the rent comes due.

Sheep and their Teeth.

FINE wool sheep live longer than medium or coarse wool sheep. The former have been used successfully as breeders from one to eight years and the latter from one to six, and more rarely seven years. This indicates the extreme period of usefulness in the flock. The prime of life probably extends from one to five or six years.

The lamb has a short and small head as opposed to the head of the mature sheep. Its teeth are smaller in every way. They are usually smooth and white, as opposed to a more corrugated, darkened surface in the old sheep. The age of sheep is told by the four pairs of incisors which are found on the lower front jaw. These are all present by the time the lamb is six weeks old.

In the yearling the central pair of small incisor teeth are replaced with a pair when the lamb is ten to fourteen months' old. They are almost twice as wide and much longer than those at either side.

At the age of two years the animal gets a second pair of large teeth.

At three years it gets a third pair of large teeth. It would then have three pairs of large teeth and one pair of small or lamb teeth.

The four-year-old has a full mouth of four pairs of large teeth. The outer ones are never as large as those in the centre.

After the sheep is four years old it is difficult to tell the exact age. With age the teeth usually grow longer and narrower. They begin at six years to resemble shoe-pegs. Sheep that are living on short pasturage and get sand with their grass wear their teeth short, even in old age. This is unusual in Minnesota. When sheep get long, peg-like or broken teeth it is time to dispose of them.—(*Agricultural Gazette*, London.)

Poultry Notes.

FROM thirty-five to forty ducks and drakes are allowed in a pen.

Ducklings are marketed at 5 lb. weight, which they should attain in ten weeks.

Have plenty of grit—the sharper the better—available for the poultry.

When hens lay soft-shelled eggs it is a sign that they are too fat. Cut down the amount of grain and feed more vegetable and green food.

Lazy hens, like lazy men, are not money-makers, but eat up the labour and profits of the busy ones. You can kill the hens, if not the men.

When you use hens for sitting don't put them where other birds can molest them. They should have a quiet place. Be sure to keep all sitting hens free from lice, and give them water regularly.

You cannot profitably raise chickens and fleas in the same house. If the fowls have body fleas, dust them with some good insecticide, renovate and fumigate the house thoroughly, paint the roosts, nest-boxes, and furnishings with a good flea paint, sprinkle a generous amount of air-slaked lime on the dropping-boards, provide new litter and nesting material, and your efforts will be rewarded in increased egg production and general thrift of your fowls.

To judge the Age of a Fowl.

In the case of a pullet, the surface under the wings will always be found interspersed with minute rose-coloured veins, which are totally absent in birds that are more than twelve months old. Again, there will be found, with pullets, a fair supply of long, silky hairs, which disappear directly the first moult is concluded. In the adult hen, the skin will be found to be perfectly white, and free from either veins or hairs; hence it is easy, at a single glance, to estimate correctly whether a bird is under or over the age that acts as a line of demarcation between juvenile and adult stock.

Additional evidence is forthcoming in the formation of the pelvic bones which, in a pullet, are much closer than in the hen that has passed the pullet age. At two years they are much wider than at one year, so that birds at this age can be readily distinguished from those of, say,

fifteen and eighteen months. The third point of difference is observable in the shanks and claws. In the young bird, the skin of the claw is supple, and the scales are thin and brilliant. The skin gets coarser and stronger and the scales harder as the bird grows, and the nail of the first toe, which does most of the work, gets much worn. There is also a difference in the eyelids. These acquire wrinkles as the bird gets older, and there is also a slightly shrivelled look on the face. This, with age, becomes more and more pronounced.

Lastly, there is the question of wing feathers—the most infallible test of all. At the conclusion of the first complete moult, which takes place when the fowl is exactly twelve months old, the secondaries alter in shape, and bear indisputable evidence as to the dividing line having been crossed. Although the surest test of all, this latter can only be ascertained by those well versed in handling feather stock.—(*Farmer and Grazier.*)

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

THE egg breeds include the small or medium-sized fowls, which are very active, quick to mature, producers of white-shelled eggs, usually non-sitters, or, at best but poor sitters, and rather poor mothers. The various varieties of Leghorns and Minorcas are good representatives of this class. Because they are poor sitters some other breed, or at least a few other fowls, should be kept if natural methods of incubation are to be employed.—G. ARTHUR BELL, *Assistant Animal Husbandman, U.S. Bureau of Animal Industry.*

“COVER CROPS.”

The term “cover crops” was originally used to include crops grown for various diverse purposes, such as to prevent soil washing, to hold drifting snow, for keeping the soil warm in winter, and to hasten the ripening of wood. As these crops were used largely in orchards and as they were often legumes, so that they might serve also as green manures, the term “cover crop” is frequently used to include crops grown in orchards primarily for green manure. The growing of leguminous crops in orchards is generally considered excellent practice, except in dry regions where irrigation is impracticable.—C. V. PIPER, *Agrostologist in Charge of Forage Crop Investigations, U.S. Bureau of Plant Industry.*

WHEN TO PICK APPLES.

In the case of apples, it is generally best to pick them, if they are to be stored or exported, just as they have arrived at their full size and when they have attained only a part of their full colour. Overripe or fully ripe fruits must be sent to the market at once, or else they must be kept in artificial cold storage in order to thoroughly stop the chemical processes within the fruit, and when they are taken from storage they are very likely to soon decay. Apples which are picked slightly green, however, generally continue to keep well after being taken from cold storage.—L. H. BAILEY (*"The Principles of Fruit-growing"*).

'THINNING PLANTATIONS.

The farmer should cut his trees so as to benefit the forest. The branchy, wide-spreading tree, the crooked tree, or the tree of a kind which is not likely to prove saleable, is the best for him to cut when he is getting out his supply of firewood. This gives room for the better trees near by to grow, as well as opening the ground for reproduction. Before a tree is cut it should be noted what trees will take advantage of the cut. Care should be taken in cutting to do as little harm to young growth (often regarded as "brush") as possible. This may sacrifice just the trees which should have grown up and set back the next cutting a dozen or fifteen years.—*U.S. Experiment Station Work*. No. XXXIX.

KILLING FOWLS.

It is a mistake to kill fowls without preparation, for when they are killed with crops filled with food it is very difficult to prepare them for table, and the flesh is soft, flabby and unpalatable when cooked. Preparation consists in confining the fowls which are to be killed in a coop or pen and keeping them without food for a period of 24 to 36 hours. The best manner of killing is to dislocate the neck, and this process ought to be learned from a poulterer or some person who knows how it should be done, as practice from a written description would inflict considerable suffering on the birds that were unlucky enough to get into the hands of an amateur. When dislocation of the neck has been properly effected the blood flows freely towards the head—but does not escape, as the skin remains unbroken—and leave the flesh bloodless, white, crisp and firm.—H. DE COURCY (*in "The Farmers' Gazette"*).

THE THERMOMETER.

To test a thermometer, place the bulb as far into the mouth as convenient and close the lips. If, in this position, it registers between 97

and 99 degrees it may be considered as approximately correct. Most thermometers have a small expansion chamber at the top of the tube, in which, occasionally, a little mercury lodges. A globule here, almost invisible to the naked eye, is sufficient to make the reading one or two degrees less than the correct one. If the mercury should get divided, place the bulb of the thermometer in warm water, gradually increasing the heat with hot water, till the mercury rises into the expansion chamber. A gentle tap on the top of the thermometer, as it cools, will probably join the disconnected portions.—J. H. SUTCLIFFE (*"Artificial Incubation and its Laws"*).

SHEEP.

Sheep, and particularly merino sheep, like a change of pasture, and a removal from one field to another occasionally will be beneficial. Where there are coarse grasses in the pastures it is a good plan to keep a few head of cattle in each paddock. The best cattle for this purpose are the Devons. They are as hardy as any other breed, and manage to pick up a living where larger framed animals would starve. The flock should be always supplied with salt. If they do not want it they will not take it, but they should have the option. An old sheep-breeder in New South Wales told me he had for many years given his sheep the following mixture with great advantage—namely, 214 lbs. salt, 14 lbs. sulphate of iron, 4 lbs. sulphur, and 2 lbs. ginger. It acts as a tonic, and keeps the sheep in excellent health.—GEORGE A. BROWN (*"Sheep Breeding in Australia"*).

GRIT AND SHELL-MAKING MATERIAL.

Grit and shell-making material are necessary for a good egg supply. The frequency of failure to supply the latter is evident from the thinness of the shells of eggs, marketed from districts where peaty soil prevails, and from the way in which the hens eat all the lime-wash off the walls of the houses in such places. If near the seashore an abundance of shells can be had for the gathering, and even if prepared oyster shell has to be purchased, 5s. worth will be sufficient for one hundred hens for a year. A heap of old mortar, if left within reach of the hens, will be eaten to the last particle, but newly-made mortar should not be left within reach, nor should the lime remaining after lime-washing, if freshly slaked lime has been used. All egg-shells from the house may be utilised, provided they are broken up and mixed through the food. In addition to shell-making material, grit must be supplied if the fowls are not running at large. Road scrapings, cinders, and broken crockery (broken

to the size of wheat) all answer the purpose, but broken flint is best of all.—MISS L. MURPHY.

“PITCHING.”

In cheese-making the term “pitching” is applied to the act of allowing the curd to remain in the whey after being scalded. In some cases the curd is not scalded, and is pitched shortly after being cut. Pitching assists the curd to mat, and brings on the acidity. Where much acid is present it is not advisable to allow the curd to pitch, but in the case of having to contend with a deficiency of acid, the pitching period should be prolonged somewhat, as the acidity in the curd develops quicker when it is left in the whey. There is more milk-sugar present in the whey than curd, and milk-sugar is the substance which bacteria of a certain type convert to lactic acid. Drawing the whey too soon generally results in the production of a curd, which, when firm enough, is much too sweet to be milled, and by the time that a sufficient proportion of acid is present the curd is much too firm and dry. This results in a cheese of dry, chalky flavour and texture. When the whey is drawn the ripening of the curd is continued in the vat or on a curd drainer. It is most essential that the curd is ripened before it is milled. Curd is considered ripe when it contains the correct percentage of acidity, moisture, and is of the right consistence for the particular variety of cheese being made.—C. WALKER-TISDALE (in *“Agricultural Gazette,” London*).

KILLING TURKEYS.

Deprive the birds of food and drink for twelve hours previous to killing. This length of time is sufficient to empty the crop, which is necessary to have the dressed turkey keep well. If starved for more than twelve hours, the birds begin to pine, or shrink in flesh, giving them more or less of a woody appearance. The length of time they are confined without food beyond twelve hours will affect the appearance of the stock. Kill by bleeding in the mouth or neck, and pick clean, but do not attempt to stick poultry in the mouth unless you understand it, because, if not properly done, they will only half “bleed out,” and when being picked, the blood will follow every feather, giving the bird a bad appearance, and rendering it almost unsaleable. Never stun them by knocking on the head or pounding on the back, as it causes the blood to settle, and injures the sale of the stock. If you sell the birds with the heads removed, kill them by beheading, leaving the neck as long as possible.—HERBERT MYRICK (*“Turkeys and How to Grow Them”*).

Meteorological Returns.

Meteorological Observations taken at the Govt. Stations for the month of June, 1910.

STATIONS	TEMPERATURE (Fahr. Deg.)				RAINFALL (In Inches)						
	Means for Month		Maximum for Month	Minimum for Month	Total for Month	No of Days	Heaviest rainfall in 1 day.		Total for Year from July 1 1909	Total for same period from July 1 1908	
	Maximum	Minimum					Fall	Day			
Observatory	72.4	52.9	80	16	4.9	3	.17	10th	50.10	41.35	
Stanger	75.0	5.6	83	45	1.09	3	.65	18th	49.41	41.91	
Verulam	74.9	48.0	85	40	.22	3	.13	15th	36.92	37.64	
Umbogintwini	76.0	47.9	83	40	.27	2	.19	6th	49.98	—	
Greytown	66.1	35.0	76	28	.22	2	.18	8th	35.09	41.93	
Winkie Spruit	72.3	5.9	78	16	.47	2	.27	13th	46.38	46.70	
Newcastle	68.3	20.4	75	14	.00	1	.00	13th	31.24	—	
Lidgerton	68.1	26.8	80	19	.18	1	.18	15th	42.20	43.38	
Estecourt	63.7	31.4	73	23	—	—	—	—	29.13	31.99	
Mid-Illovo	70.0	45.7	78	39	.20	2	.18	14th	39.96	41.12	
Bulwer	60.3	31.9	69	24	.25	2	.16	14th	—	—	
Ixopo	—	—	—	—	.19	2	.13	13th	—	—	
Imbizana	73.2	50.0	83	45	.05	1	.05	15th	43.75	39.97	
Port Shepstone	73.9	52.0	81	45	.15	1	.15	5th	45.59	40.69	
Umzinto	77.9	41.0	82	38	.08	1	.08	7th	45.49	46.31	
Richmond	68.4	29.8	75	31	.29	2	.21	13th	46.18	55.54	
Maritzburg	72.2	35.8	80	32	.14	3	.08	13th	38.83	37.99	
Howick	67.1	32.8	74	25	.10	1	.10	13th	31.05	40.50	
Ladysmith	72.9	36.9	85	26	—	—	—	—	27.11	—	
Dunder	66.2	39.9	75	31	—	—	—	—	29.16	39.63	
Weenen	—	—	—	—	—	—	—	—	—	33.29	
Camperdown	72.5	44.7	85	35	.24	2	.14	14th	—	—	
Krantzklouf	66.0	50.7	79	44	.7	4	.05	14th	48.90	42.45	
New Hanover	71.5	39.1	78	30	.19	1	.19	13th	46.89	43.06	
Krantzkop	65.6	37.7	70	28	.00	1	.00	8th	39.23	35.68	
Mtunzini	79.4	49.2	82	30	.28	1	.28	19th	55.85	—	
Nongoma	69.9	47.3	83	42	.85	3	.45	20th	33.67	—	
Utrecht	77.2	39.7	8	32	—	—	—	—	26.43	—	
Charlestown	60.8	32.8	68	21	—	—	—	—	31.79	45.41	
Vryheid Gaol	60.7	12.4	75	30	.27	3	.18	14th	32.68	—	
Ilabisa	73.7	51.0	81	48	.65	1	.65	20th	58.20	47.56	
Mahlabatini	78.4	41.2	84	39	.23	2	.13	19th	31.65	32.64	
Melmoth	66.6	47.6	80	41	.18	2	.15	14th	33.87	31.12	
Umbombo	67.0	52.0	77	42	.68	3	.32	20th	54.89	42.37	
Empangeni	74.5	49.4	84	42	.71	4	.25	18th	54.67	45.63	
Nottingham Road	63.1	23.3	74	15	.09	1	.09	13th	31.02	—	
Pauplietersburg	69.8	36.1	78	28	.21	4	.11	14th	—	—	
Cedara	66.7	27.3	77	21	.17	6	.10	14th	—	—	
Point	—	—	—	—	.45	3	.33	13th	54.16	—	

Meteorological Observations taken at Private Stations for the Month of June, 1910.

STATIONS	TEMPERATURE (In Fahr. Degs.)		RAINFALL (In Inches)						
	Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day		Total for Year from July 1, 1909	Total for same period from July 1, 1908	
					Fall	Day			
P. M. B. Botanical Gardens ..	77	28	.20	2	.13	13th	34.93	—	
Ottawa ..	—	—	.37	3	.15	14th	38.36	38.09	
Mount Edgecombe ..	—	—	.16	1	.16	14th	45.41	—	
Umzinto, Beneva ..	—	—	—	—	—	—	41.99	41.83	
Riet Vlei ..	—	—	.06	1	.06	8th	28.86	—	
Cedara—Hill Station ..	78	30	.15	2	.12	14th	—	—	
Cedara—Vlei Station ..	77	21	.17	6	.10	14th	—	—	
Winkel Spruit ..	78	46	.47	2	.27	13th	46.3	46.76	
Weenen ..	82	24.05	—	—	—	—	21.61	—	
Giant's Castle ..	57.25	31.87	.07	1	.07	14th	41.76	49.23	
Umhlangeni ..	—	—	.10	1	—	—	—	41.88	
Hilton ..	75	30	.13	2	.11	13th	41	43.32	

Coal and Labour Return.

Return of Coal Raised and Labour Employed at the Natal Collieries for the month of June, 1910 :—

COLLIERY	Average Labour Employed					Output Tons Cwt.
	Productive Work			Un-productive Work *	Total	
	Above Ground	Below Ground	Total			
Natal Navigation ..	380	726	1,106	18	1,124	26,026 13
Durban Navigation ..	244	784	1,028	17	1,045	22,127
Elandslaagte ..	296	729	1,025	25	1,050	19,140 16
Glencoe (Natal) ..	177	526	702	26	728	14,804 10
St. George's ..	248	450	698	6	704	13,973
Natal Cambrian ..	180	496	676	31	707	13,296 —
South African ..	161	442	603	10	613	12,011 18
Dundee ..	265	487	752	—	752	11,662 9
Hlobane ..	143	301	444	36	480	8,248 15
Hatting Spruit ..	84	270	354	8	362	7,469 10
Burnside ..	114	235	349	183	532	7,802 6
Ramsay ..	88	146	234	5	237	6,140 16
Natal Steam Coal Co. ..	89	212	297	—	297	6,352 —
Newcastle ..	74	311	385	26	411	9,906 6
Talana ..	84	211	295	21	316	4,772 15
Ballengeich ..	86	126	211	12	223	5,989 13
West Lennoxton ..	47	76	123	—	123	1,500 15
Dewar's Anthracite ..	11	11	22	9	31	220 —
Mooklapt ..	—	26	26	—	26	90 14
Vryheid ..	6	8	14	—	14	38 —
Vaalbankt ..	—	8	8	8	16	17 —
Makateese Kop ..	3	—	3	—	3	10 —
Totals ..	2,775	6,580	9,355	439	9,794	186,234 14
Corresponding Month, '09	2,461	4,983	7,444	457	7,901	127,798 9

	Productive Work			Un-productive Work	Total, June, 1910	Total, June, 1909
	Above Ground	Below Ground	Total			
Europeans ..	231	210	441	63	504	492
Natives ..	1,009	4,376	5,385	268	5,653	4,334
Indians ..	1,635	1,994	3,529	103	3,637	3,165

* Cost charged to Capital Account.

† Includes May return.

Mines Department, Pietermaritzburg,
7th July, 1910.

CHAS. J. GRAY,
Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal Bunkered and Exported from the Port of Durban for the month of June, 1910:—

					Tons. Cwt.
Bunker Coal ..	..	..	..	..	93,211 16
Coal Exported ..	..	..	..	..	38,471 18
Total ..	..	..	..	..	126,683 14

Customs House, Port Natal.
8th July, 1910.

A. D. C. AGNEW,
for Collector of Customs.

Pound Notices.

NOTIFICATION is contained in the *Provincial Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :—

ON THE 10TH AUGUST.

Acton Homes (Bergville)—(1) Merino ewe sheep, swallow tail, both ear, no brands. (2) Merino ram lamb, half-moon right ear, no brands. (3) Merino ewe lamb, half-moon right ear, no brands. (4) Black she-goat, swallow tail both ears, no brands. (5) Black kid, swallow tail right ear.

Vryheid—Impounded by A. Armstrong, Lekkerwater, Vryheid, aged merino ram, V both ears ; probable value, 10/-.

ON THE 17TH AUGUST.

Hope Farm (Newcastle)—Bay gelding, 14 hands, few white hairs on forehead, shod all round, three shoes cast, slight sore back.

Ingogo—Five sheep, branded C.J. on left side, long horns. Impounded by J. McDuling, Mount Prospect on 20th June.

Ladysmith—Small black goat, with bluish neck and hind quarters, ears slit.

Mount Hope (Klip River)—(1) Goat, W cut out of tip of right ear, tip cut off left ear. (2) Goat three slits on side of right ear. (3) Two merino ewes, branded O on left side.

Woodstock (Bergville)—(1) Six merino sheep, branded I.W., some on right side and some on left side, swallow tail on left ear, and piece out of right ear. (2) Merino sheep, branded R.H. on right leg and T2 on left side, winkel haak on back of right ear. (3) Kafir goat.

ON THE 24TH AUGUST.

Hatting Spruit—Five merino sheep, brands indistinct, U cut out tip of right ear and piece cut out back of left ear.

ON THE 31ST AUGUST.

Woodstock (Bergville)—(1) Seven bastard sheep, one marked hole ending in slit out of right ear, and slit in left ear. (2) One marked swallow tail and winkel haak in right ear. (3) One marked swallow tail in left ear and slit in right ear. (4) One marked slit in each ear. (5) One marked half-moon in left ear, and swallow tail and winkel haak in right ear. (6) One marked half-moon in right ear, and winkel haak and V in left ear. (7) One no marks, no brands. (8) Two black and white lambs, lambs of the above.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Division of Agriculture & Forestry Notices

FEEES FOR AGRICULTURAL ANALYSIS.

It is hereby notified that Farmers and others can secure analytical determinations from the Government Laboratory, Central Experimental Farm, Cedara, in accordance with the following scale of fees, which is subject to revision :—

	Scale I.	Scale II.
	£ s. d.	£ s. d.
FERTILISERS AND FEEDING STUFFS :		
Determination of 1 constituent	0 7 6	0 5 0
Determination of 2 or 3 constituents	0 15 0	0 10 0
Complete analysis	1 1 0	0 15 0
SOILS : Partial analysis of a soil in relation to its fertility	1 1 0	0 10 6
Complete analysis of a soil	2 2 0	1 1 0
WATER : Irrigation and drainage	1 10 0	0 10 6
VEGETABLE PRODUCE : Fodder, Ensilage, Grain, &c.	1 10 0	0 15 0
MILK, CREAM, BUTTER : Fat only	0 5 0	0 2 6
„ „ : Complete	0 15 0	0 7 6
WATTLE BARK AND TEA : Tannin	0 5 0	0 2 6
CATTLE DIPS : Quantitative analysis of 1 to 3 principle constituents	0 10 0	0 5 0
INSECTICIDES :		
Qualitative analysis each constituent	0 5 0	0 2 6
Quantitative „ „ „ „	0 10 3	0 5 0

Scale No. 1 is applicable to samples handed in by merchants and Dealers, and where trade interests are involved.

Scale No. 2 is applicable to samples forwarded by *bona fide* Farmers and Gardeners.

Samples will be accepted at the discretion of the Director, and must be properly selected and labelled.

The Department reserves the right to publish the results of any analysis performed by it ; and, where such is deemed of sufficient public interest, it will remain at the discretion of the Director to remit any charges hereunder.

TREES FOR SALE.

To encourage tree-planting, transplants and seeds of forest trees are supplied by Government, so far as in stock, at the undermentioned rates, exclusive of carriage, from the Government Nursery, Central Experimental Farm, Cedara.

Transplants of Eucalyptus, Pines, Acacias, Casaurinas, Cupressus, etc., about 25 trees in each tin, at 8s. 4d. per 100 trees. Trees in separate tins at 1s. each.

Transplants of scarce kinds, larger trees, or surplus stock, when available, will be charged at special rates, which will be furnished on application.

Tree seeds, in variety, at 6d. per packet. Price per pound, which fluctuates, will be furnished on application.

Package and postage of seed, when required, charged 1s. per lb. extra.

Orders cannot be accepted for a smaller number than 100 trees.

PURCHASE OF TREE SEEDS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased ; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

POULTRY.

Cockerels and a few Pullets of the following breeds for sale :—Buff Orpingtons Wyandottes, Plymouth Rocks and Black Leghorns.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible :—

Admittance of Students to the School of Agriculture.—House Master, Cedara.
Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.
Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Isopo.
Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.
Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.
Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.
Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.
Fruit.—Orchardist, Cedara.
Accounting Business.—Accounting Clerk, Cedara.
Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.
Apiculture — Apiarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry, cedara.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

Charges in respect of Cattle and the Meat of Cattle.	Calves up to one year old.	Cattle over one year old.	
		Rate per single head.	After reaching 100 head in month.
<i>Abattoir.</i>	s. d.	s. d.	s. d.
1. Receiving, per head...	0 3	0 6	0 3
2. Killing and Dressing, per head ...	2 0	3 6	2 9
3. Disinfectants ...	0 1	0 1	0 1
4. Cleaning Tripes, each ...	0 6	0 6	0 6
5. „ Sets Feet, per set ...	0 6	0 6	0 6
6. „ Calves' Heads, each ..	0 9	—	—
<i>Bagging Charge</i>			
1. Per Body of Beef ...	1 3	2 6	1 9
2. Bagging Labour, per body ...	0 3	0 6	0 3
Hessian, 3d. per yard.			
<i>Special Storage Rates for Chilling up to 72 hours.</i>			
1. Chilling Beef, per body ...	1 3	2 9	1 9
2. Chilling Offal, per set ...	0 6	1 0	0 6

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg, 21st December, 1908.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127. An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement after 25th April next. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 131.—Age 20. Was a student at College of Agriculture, Cape Colony, where he gained a diploma. Has also won prizes for butter making at the Rosebank and Port Elizabeth Shows. Has been in the services of the Orangia Creamery Co., Bethlehem, which he left on account of conditions of employment not being suitable to his requirements.

No. 132. Age 37. Has had nine years experience as Assistant and Manager on Tea Estate in Assam, and has a thorough practical knowledge of tea making in all its Departments. Would like to obtain an appointment in a Tea Garden in Natal. Has a knowledge of several Indian languages.

No. 133.—Desires appointment as Farm Manager. Has had a thorough knowledge of growing and packing fruit, also lucerne growing and hay making. Has also had experience in Ostrich and Stock farming.

No. 134. Age 37. Wishes to obtain experience on an Ostrich farm for a year. Would be willing to invest £700 at the end of the term of probation, and on the expiry of a year's partnership would be willing to increase that sum to £1,000.

No. 135.—Age 35. Has a knowledge of poultry and bee-keeping. Total abstainer. Non-smoker. Good references. Is anxious to get on to a farm.

No. 136.—Wishes to secure employment on an Ostrich farm. Very good references.

No. 137.—Understands carpentry and wagon making. Is anxious to secure a position on a farm.

No. 139.—Age 25. Seven years' experience in mixed farming in Springfield District.

No. 140.—Age 25. Colonial born. Has had 3 years experience on farm. Two years in the Mooi River Division, and one year Dairy Farming in the Transvaal. Good references; speaks Zulu.

No. 141.—A married man seeks employment on a farm, has had much experience with stock. Understands Native language.

No. 142.—Age 36. Tea Planter, twenty years experience, India, Ceylon and Natal. First class references and gold medalist. Expert knowledge of Tea factory engineering, planting, and manufacture—New openings a speciality. Fluent Indian linguist, and capable business man. Wishes to take over complete charge of large Tea concern. Liberal salary expected, and first class work guaranteed. Correspondence invited from Companies or Capitalists.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

EMPLOYMENT FOR GIRLS.

The Minister of Agriculture has received a letter from the Chairman of the Transvaal Land Settlement Board, stating that he has been asked by several correspondents in England if there are any openings in South Africa, such as in creameries, for girls trained at Bromsgrove Colonial College and other such training centres in England. We should be glad to hear from any institutions or farmers in Natal who may be in a position to offer situations to girls who have been trained at such Colleges, when we shall be pleased to place them in communication with the Chairman of the Transvaal Land Settlement Board.

Farm Apprentices' Bureau.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | | |
|--------|---------|----------------------|--|
| No. 3. | Age 24. | Colonial born | Has a knowledge of bookkeeping. |
| „ 15. | Age 19. | | Is desirous of learning farming. |
| „ 25. | Age 23. | Bricklayer by trade. | Is anxious to get on a farm. |
| „ 27. | Age 19. | | Has had one year's experience on a farm in the Cape Colony. |
| „ 40. | Age 24. | | Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm. |
| „ 47. | Age 21. | | Is anxious to obtain a situation on a farm. Has been in iron-mongery trade for 2½ years. |
| „ 53. | Age 17. | | Has had 18 months' experience of farming in Zululand. Speaks Zulu. Understands cattle and horses. |
| „ 56. | Age 20. | | Strong, tall and healthy, good rider, fond of stock, and has had some years experience of general farming. Small salary required with board and lodging. |

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.



A HEALTHY-LOOKING MAGNUM BONUM ORANGE.

This Orange Tree, which was photographed recently by our representative on the occasion of a visit to Mr. P. H. Campbell's fruit farm, "Blink Bonnie" in the Chase Valley, is growing on old wattle and blue gum land; and it is a fair specimen of what this particular section of Mr. Campbell's orchard can produce. Kraal manured crops have been grown between the rows, and one or two dressings have been forked in around the trees. The trees have been fumigated and sprayed regularly.

The Natal Agricultural Journal.

The Land Bank.

THE Land and Agricultural Loan Fund, popularly known as the Land Bank, having now been in existence for two years, a statement as to the actual working of the same will doubtless prove of interest to our readers and tend to disperse those doubts as to its usefulness and facilities which even now appear to linger in the minds of the agricultural community judging from the references occasionally made to it by farmers.

Enquiry at the office of the Secretary to the Fund elicits the information that, up to the close of the last financial year (June 30th, 1910), in all 552 applications for loans had been received aggregating £225,000. Of these, 303 had been accepted for £170,000; 156 had been declined for £100,000; and 16, totalling £40,000, had been withdrawn. The remaining 17 applications for approximately £15,000 were still in abeyance. Of the loans accepted, 281 had actually been paid out for a total of £160,000, the average loan being for £570. This £160,000 had been used for the following purposes:—

	£
To pay off existing liabilities	90,000
To effect improvements	20,000
For purchase of live stock and plant . . .	50,000
	<hr/>
	£160,000
	<hr/>

The amounts lent to the various districts in round figures were:—

	£
Vryheid	40,000
Babanago	10,000
Utrecht	16,000
Paulpietersburg	11,000
Klip River County	16,000
Weenen County	10,000
Umvoti County	15,000
Pietermaritzburg County	22,000
Alfred County	7,000
Alexandra County	9,000
Durban County	350
Victoria County	120
Zululand	10,000

Approximately £7,000 has been advanced on the security of sugar cane crops growing on Crown leaseholds in Zululand. The conditions of these loans are that one quarter of the amount advanced be repaid each year out of the crushing of the cane, Act No. 28 of 1907 amending Act No. 27 of 1907, limiting the period of such advances to less than the life of the crops.

Section 20 of Act No. 27, 1907, which created the Land and Agricultural Loan Fund of Natal, lays down that no loan shall be granted by the Board to any person for a less amount than £50 or for a larger amount than £1,500, nor shall any person who is already indebted to the Fund in the sum of £1,500 be capable of receiving any further advance.

The Fund is managed by a Board consisting of five Commissioners. These are Mr. W. J. O'Brien, of Pietermaritzburg (Chairman); Mr. P. R. Botha, of Greytown; Mr. Wm. McFie, of Maritzburg and Highlands; Mr. Geo. Mackeurtan, of Durban; and Mr. Herbert Hillar, the Registrar of Deeds, who is also Manager. The office is in charge of the Secretary, Mr. E. T. Mullens, who was formerly in the Department of Agriculture.

The Board can only make advances on the security of a first mortgage on the following classes of land not being within the limits of any borough or township:—(a) Freehold land; (b) Quit rent land; (c) Land held under agreement of purchase from the Crown; (d) Land held under lease from the Crown; and (e) Land held under private lease provided the landlord becomes a joint mortgagor. It is not surprising to learn, in view of the condition laid down by Section 15 of Act No. 27 of 1907, that the landlord shall become joint mortgagor, that not a single loan has been made upon private leasehold. No landlord has apparently yet been found to take this risk.

The greatest complaint which has so far come to our ears, is as regards advances upon the security of Crown lands. This, however, is due to the working of the Act and not to any want of liberality on the part of the Board. Section 17 of the Act lays down that, where the advance is made upon the security of Crown lands partially paid for, such advance shall not exceed three-fifths of the amount of the purchase price already paid on account of such land, but the Board may in its discretion add the value of any immovable property already on the said land. Section 1 of the Act defines "immovable property" as all property regarded as such by law. The Crown lands are now being allotted on terms which include no payment of rent till the end of the third year and which make no stipulation regarding the erection of a substantial dwelling-house. It is extremely doubtful whether any of the improvements usually put into Crown land (save and except substantial dwelling-houses) would be regarded as "immovable" by law; and it is not advisable for a beginner

in agriculture to spend more than is absolutely necessary on a dwelling-house, as capital so sunk brings in no return. The position, therefore, is that the wording of the Act practically precludes the Board from rendering any assistance to settlers on Crown land until they have paid considerable amounts in the way of purchase price and have erected substantial dwelling-houses. Notwithstanding these drawbacks, 29 holders of Crown lands have been granted loans totalling approximately £8,900. The Board can only advance money upon the security of standing or recurring crops in the case of Crown leaseholds.

Borrowers have their choice of either taking a fixed loan for a period of five years at £6 per cent. interest or what is known as an instalment loan for a period of 35 years at approximately £6 18s. per cent. interest. The difference between the two systems can be best illustrated by taking the case of a £500 loan. As a fixed loan for five years, a borrower of £500 would pay in interest during that period £150 and would at the expiry thereof have to repay the full sum of £500. As an instalment loan (which bears the right of repayment at any time without notice), the borrower of £500 for the same period would pay in interest (*i.e.* instalment and interest) £171 13s. 4d. (or £21 13s. 4d. more than if he had a fixed loan), and would have to repay at the expiry thereof £175 3s. 1d., or £24 16s. 11d. less than the fixed loan borrower. Allowing for the extra interest he has paid, he is nevertheless still £3 3s. 7s. to the good.

Learning that a certain number of loans have already been repaid in full, we enquired for particulars of the same so as to show the practical working of the same. The information, as supplied by the Secretary without disclosing identity, is as follows:—

No. 1. Borrowed £500 as fixed loan for 5 years, on security of freehold land. Loan was paid out January, 1909, and repaid May, 1909. Cost of loan to borrower, including valuation and all charges, was £6 16s. exclusive of interest.

The cancellation of the bond in each case costs borrowers 4s. 6d., but interest ceases the day the money comes to hand.

No. 2. Borrowed £200 as instalment loan for 35 years on security of Crown land. Loan was paid out December, 1908, and repaid January, 1910. Cost of loan to borrower, including valuation and all charges, was £4 17s. 9d. exclusive of interest.

No. 3. Borrowed £200 as fixed loan for 5 years on security of Crown land. Loan was paid out October, 1908, and repaid January, 1910. Cost of loan to borrower was £3 9s. exclusive of interest.

No. 4. Borrowed £300 as fixed loan for 5 years on the security of freehold land. Loan was paid out October, 1909, and repaid the following month. The cost to borrower, including valuation, the interest due on the loan as well as the cancellation of the bond, was £12 16s. 7d.

No. 5. Borrowed £200 as fixed loan for two years on the security of Crown land. Loan was paid out October, 1908, and repaid in February, 1910. The cost to borrower was £3 9s.—the same as No. 3.

No. 6. Borrowed £400 as fixed loan for 5 years on security of Crown land. Loan was paid out September, 1908, and repaid in February, 1910. The cost to borrower was £5 1s. 6d.

In addition to the right of repaying the whole of the loan at any time without notice, no matter for what period it may have been borrowed, Sub-section (4) of Section 24 of Act No. 27, 1907, lays down that, irrespective of the prescribed half-yearly instalments, the mortgagor shall be given the right from time to time or at any time to pay any sum not being less than £5 or any multiple thereof in reduction of the mortgage debt: provided that no such payment shall affect the prescribed half-yearly instalments or the obligations of the mortgagor thereto. Sub-section (5) goes on to say that all such payments shall be credited with simple interest at the rate payable on the loan, until such payments, together with the accumulations of interest thereon, are equal to the balance of the principal for the time being according to the said table, together with all other monies, if any, owing under the mortgage. Such payments shall be set-off against such principal and other monies, and the mortgagor shall be entitled to the discharge of the mortgage on payment of the prescribed fees.

The effect of such partial repayments is, explains the Secretary, to shorten the period during which the loan is outstanding; and is a considerable convenience to borrowers who may have £50 or £100 in hand available for the reduction of the debt. Several payments on account varying from £30 to £200 have already been made by borrowers.

The only complaint known to the Secretary regarding the charges made by the Fund is in connection with the cost of valuations. Such cost, however, rarely exceeds £5 5s., and, where small amounts are borrowed, or sufficient cause is shown to the Board, valuations are sometimes dispensed with. On the other hand, the Secretary pointed out that the Fund does not charge any commission on the amount of the loan and that those who complain of the cost of valuations would probably have to pay two per cent. commission should they obtain their money from an agent. The Fund being a Government institution, there is no need whatever for borrowers to employ an agent to look after their interests, and this expense of commission is avoided by all those who apply direct.

Asked as to whether the Fund was paying its way, the Secretary replied in the affirmative, and stated that the annual financial statement now being prepared for publication in the *Gazette* would show a profit on the working of the last financial year. There was naturally a de-

deficiency on the working of the first year, as the Fund started in May, 1908, and no loans were able to be made until about August of the same year; and considerable expense was incurred in the printing and binding of the necessary ledgers and forms, purchase of furniture and stationery, etc. The profit of the last year was not sufficient to wipe out the deficiency, but had considerably reduced it. The third annual statement would, without any doubt, show a considerable surplus on the right side. In a few years' time, the Board should be in a position to reduce the rate of interest. The Fund was entirely self supporting, paying for everything, including postages, like a private institution; and the average of applications for loans was being sustained. Those borrowing can do so without any feeling of dependence, knowing that they are paying a fair rate of interest for the money which more than covers the cost of administration and the amount itself paid by the Board for interest to the Public Debt Commissioners. The six per cent. interest paid by borrowers is divided up as follows:—4 per cent. is paid to the Public Debt Commissioners, $\frac{1}{2}$ per cent. is placed to reserve, and $1\frac{1}{2}$ per cent. goes towards expenses of administration. The Reserve Fund is also credited with interest at the rate of four per cent., and on the 30th June, 1910, already amounted to nearly £700, so that the Fund appears to be in a healthy condition.

Dutch cheese is usually spherical and oval in shape, softish in texture, and coloured red. It has a peculiar flavour and is usually made with rather too much salt to render it agreeable to delicate palates.

Set turkey eggs under a gentle chicken hen. Three days before hatching put eggs in a basin half full of good warm water, or enough so eggs will float, and you will be able to tell every egg that will hatch. You can notice them move slightly, and next morning and third morning the little turks will be so strong they will sometimes pip the egg in water, but always above the water. So do not be afraid to test the eggs in this way.

Ripened cream is more "churnable" than sweet cream. The churnability of cream may be described as the power of the cream to yield its fat as butter—the more churnable the cream the more butter will be obtained in the process of churning.



Salt for Sheep.

MOST farmers are aware of the value of salt for sheep, as well as for other animals of the farm, but at the same time the matter is very often neglected, and a few words of advice at the present time may not be out of place. When it is realised that one half of the solids in the blood consist of common salt, and that a sheep secretes about half an ounce of salt every week in its evacuations, the importance of making provision for this heavy drain will be better understood. Of course, it may very reasonably be asked why it should be necessary to give sheep salt when in their wild state they had to do without it. The answer to this is that in their wild state sheep had a much larger area in which to roam than they have under domesticated conditions, so that they had a wider range of plants to eat: and they had also other facilities for obtaining a certain amount of salt than they have on our farms. Of course, on large farms, if salt is not supplied, the sheep endeavour to get it by licking the earth or exposed rocks, but it is very doubtful whether they secure enough in this way. At any rate, experience has amply proved that sheep thrive much better if they have salt given to them than if they are obliged to find it in a natural way as best they can; it improves the appetite, prevents "perverted" appetite which results in their eating all sorts of rubbish, improves the digestive faculties, and lessens the chance of attack of various parasites. The most convenient way to administer the salt is, of course, by means of the "salt lick," lumps of rock salt being used for the purpose and placed where the sheep can get at them easily and lick them as they feel inclined. This is the most natural way to administer salt, and the animals take just what nature impels them to.

Ostriches in Queensland.

In view of the extension of ostrich farming in Natal and of the practical monopoly of the industry which South Africa at present enjoys, some details as to the efforts which Queensland is making to establish this branch of farming there will be of interest. A recent number of

Dalgety's Review, published in Australia, contains a short article on the subject, in which the opinion is ventured that "the extension of ostrich farming in Queensland is only a question of time," and, considering how well ostriches appear to do in other parts of the world where they have been tried, we are inclined to endorse this remark, but one very important obstacle to the progress of the industry, as our contemporary points out, is the difficulty in obtaining birds. Furthermore, the *Review* continues, "the ostrich is a slow breeder, and does not begin to lay its eggs until it is three years old; and to import them from the South African farms is at present not possible, for ostrich farming has become so profitable there that export from that country is prohibited. It is said, however, that good birds can be obtained from Egypt. It would encourage this industry if, as in New South Wales, the Queensland Government would secure a couple of well-bred and matured birds and place them at one of the State farms, and by experiments discover the best methods of rearing their young ones, and of the treatment of them generally, and in this way a supply of birds could be provided, and ranches in the State could be established on a satisfactory basis. Similar encouragements have been given to other industries—many of them with not the possibilities of profit that may be found in this one."

"No part of Australia," says our contemporary, "can furnish better spots for ranches. The climate, the natural grasses, the soil to produce lucerne, the main feather food, the freedom from frosts, the artesian supplies of water, all make many districts in Queensland most suitable for ostrich cultivation. Mr. Behan, of Garfield, near Jerico, has made his farm a complete success. There were initial difficulties to overcome in the rearing of the young birds, and in the production of the most valuable kind of feathers, but by careful breeding and treatment of the hatched broods, and the proper management of his stock, he has now a farm worth visiting. He has a good number of full-grown birds, which yield their crops of feathers, fetching a good price in the market, and many young birds full of promise for the future. His farm is an object lesson for the whole State." The article concludes: "There is a greater demand for the feathers in the Commonwealth, and there is room for much more ostrich farming to supply it, and in Queensland there is every facility for its development and increase." Our Australian cousins are very much "alive," and, though there is no fear of serious competition in the immediate future, we shall nevertheless have to look to our laurels, and one of the best ways of doing this will be to spare no efforts to produce and maintain a high standard of quality in our feathers.

Soft Butter.

In the course of an article on the subject of soft butter and its remedy, *The Dairy* has some useful advice to offer which is worthy of repetition here. The cause, as our contemporary remarks, lies in the high temperature of the dairy, and unfortunately many a farm-house dairy is indifferently fitted for its purpose. The article remarks, *inter alia*:—Every effort must be made to keep the apartment cool, as unless this can be done there is little hope of overcoming the difficulty. During the heat of the day, when the outside air is warmer than that inside, the corridors should be kept closed, or their place may well be taken by white canvas kept constantly moist. When the air outside is cool it should be admitted freely. In many cases a cool dairy for churning can be obtained only by doing the work very early in the morning or late in the evening. In any case it is essential that the cream be at a low enough temperature when placed in the churn. If not, the resulting butter will be an oily mass, with no grain to speak of, difficult to wash and to salt, and impossible to work properly. The right temperature for the cream in summer is between 50 and 54 degs. F., but if it does not rise above 56 degs. it may be considered fairly satisfactory. The cream may be brought down to this temperature by standing it in cold water or ice. Water from a deep well is always cold, and is a great help in the dairy. If both cream and churn are cool when churning starts there is every chance of turning out firm butter, for if it leaves the churn in good condition it is not difficult to keep it right.

One great assistance in getting firm butter in summer is brining instead of dry salting, our contemporary proceeds. Not only does dissolving the salt in water bring down its temperature, but the method also facilitates the uniform salting of butter that tends to be soft, which is otherwise a very difficult matter. The brine may be prepared by dissolving one pound of salt in a gallon of water. The degree of saltiness of the butter is determined by the length of time it remains in the brine. If it is left for ten minutes the butter will receive about a quarter of an ounce of salt to the pound, and for heavier salting it may soak up to thirty minutes. The brine is put into the churn as the last of the washing waters, all of which must be cool, and the churn given two or three turns. The butter can then be left in the brine while the worker is got ready.

Further Machinery Enterprise.

The well-known firm of Messrs. G. North & Son, agricultural implement and machinery merchants, of Durban, have recently opened a new branch at Harrismith in order that they may better cope with the



MANDARIN TREES AT CHASE VALLEY.

Some people have the idea that fruit trees do not do well on land on which wattles been growing, but Mr. P. H. Campbell's experience has been to the contrary. With regard to the particular trees illustrated above, Mr. Campbell writes:—"These Mandarin Trees were put in after some large Wattle Trees had been cut down and the Roots grubbed out. The ground was kept clean but not cropped. The year of the great Blizzard they were very much knocked about. They have had no special manuring for some years and the ground underneath them has the grass known locally as Durban running grass. They have always been good croppers but this year they were so loaded with fruit that I had to prop them up with Bamboo poles to keep the branches from breaking down. I do not think that Wattle trees are harmful to the soil for fruit, but crops do not do so well on plantation land for the first year or two till all the roots and wood, &c., have quite turned to mould or rotted away—at least that is my experience."

constantly increasing demand for their goods in that territory. This enterprising firm deserve hearty congratulation upon their continued success, which is due entirely to their up-to-date and progressive methods, combined with the undoubted excellence of their goods, and the close study they give to the conditions prevailing in this country. Messrs. North & Son have now four branch houses established, *viz.*:—**Maritzburg, Johannesburg, Pretoria, and Harrismith.** We take this opportunity of wishing them success in their latest enterprise.

Sugar Manufacture for "Small Men."

The "Hadi" process of sugar manufacture, which was introduced some years ago by Mr. S. M. Hadi, Khan Bahadur, Assistant Director of Agriculture, United Provinces, is, we learn from the *International Sugar Journal*, proving of great assistance to small land holders and others in India desirous of producing sugar direct from juice in localities where the supply of cane is limited. The process consists essentially in boiling the cane juice in a series of three open pans, arranged to work continuously over a furnace in such a way as to facilitate economy of fuel. The juice is clarified by addition of a dilute sodium carbonate solution and the juice of *Hibiscus esculentus* to the gradually heated juice, the scum being removed by hand. The juice is boiled to a heavy density and is stored in ghurras (bottle-shaped earthen vessels holding about 60 lbs. of *masse cuite*). There it is allowed to cool and crystallise for 10 days and after that the vessels are broken up, and the *masse cuite*, including that scraped off the broken pieces, is cured in a hand centrifugal. The cured sugar is dried in the sun, and the molasses is re-concentrated and then stored in similar vessels as was the first *masse cuite*. It is now allowed to stand over for three weeks before it is cured, and then it yields second sugar and molasses.

Commenting upon this method of sugar manufacture, our contemporary remarks:—"In comparing the results of Hadi's process with those of modern sugar factories employing vacuum pan evaporation, where no such extensive loss is experienced during the boiling, we need not be too critical; we need only to bear in mind that it enables sugar to be manufactured in places where the supply of cane is limited, and where, but for Hadi's process, probably none would be grown. The point to emphasise is to see that the process is confined to its proper sphere, which is that of working up *small* quantities of juice, and is not employed in large factories where other and more elaborate systems of plant would be a *sine qua non*. It is generally conceded that large central factories of the type existing in Java and Hawaii, to work directly from juice, have little chance of success in Upper India, one of the principal reasons being

the scattered distribution of the cane crop. There is, however, no reason why a small and efficient plant working from 100 to 200 acres of cane in the season, and employing vacuum pan evaporation and improved methods of clarification, should not be a success."

Preparation of Maize Samples.

According to a message to the *Natal Mercury* from Bloemfontein, the samples of this year's maize which the Maize Committee, at its meeting in Bloemfontein, agreed should be issued to the trade are now being prepared there, under the direction of Mr. C. McG. Johnston, secretary of the Free State Agricultural Society. Some thousands of samples are up to the present ready for distribution. The bags containing samples have been locally made. Each set of samples consists of 15 bags, containing 15 different grades. The bags are inscribed on the front as follows:—"Standard of South African maize, flat white, No. —. Harvest 1910." On the reverse there is the grade mark. In regard to the grade mark, it is interesting to note that to facilitate the ordering a standard list has been prepared, in which the various grades have been numbered, and the grade mark on the reverse of the bag is the number of grade which corresponds to the official list, so that any quantity can be ordered by simply quoting the number on each sample by the grader.

The following, it is stated, are the various grades:—Flat white, 1, 2, and 3. This kind of maize is the only type which has been divided into three grades, the reason being that a very high quality is being produced in certain parts of South Africa, chiefly in Natal, and it was thought advisable to have a special grade, *viz.*, 1) for this F.W., (2) being ordinary and F.W., and (3) indifferent. Other grades are: Flat yellow 1 and 2; round white, 1 and 2; round yellow, 1 and 2; flat mixed (established to meet the growing in the Transvaal of hybridised white mealies); round mixed (for Basutoland); mixed grain and Kafir corn: white (1), ping (2), and mixed (3). In addition to this, a new grain is being introduced on the market, called "jiba," which is a better Kafir corn, known in parts of Natal as "bird" or bitter corn. Samples of this grain are also being sent to Britain for the purpose of ascertaining if any trade can be found in this export. Pending the appointment of a chief grader for the whole of South Africa, the distribution of samples is being proceeded with. The sale of these sample sets to merchants has been officially authorised at 10s. per set.

Mustard for Poultry.

It is open to debate whether a hen can be forced to lay more eggs than a certain number, the number varying according to the prolificacy

of the individual; but, from experiments which have been conducted, it has been demonstrated that it is possible to obtain a fair percentage of her eggs during the winter months, thereby securing a greater profit than if they were laid during the late spring and summer. In an article on the subject of mustard feeding for poultry, the Editor of *Monthly Hints on Poultry* refers to a test which is being made at Llangammarch Wells. It appears that at the expiration of the twenty-ninth week the mustard pen was leading the ordinary-feed pen by 163 eggs, but that by the thirty-third week the lead had been reduced by 163 eggs, and by the thirty-eighth week of the test to 133. The experiment is not concluded yet, but the results will be awaited with interest. "Unhesitatingly," the Editor comments, "the experiment so far has proved a success, and those who act upon it during the coming winter should benefit by it." Some doubt appears to have arisen as to why it is being continued during the hot summer months. The only reason, for it, we learn, is to subject the birds to a prolonged test—twelve months—and then kill and examine them, to ascertain whether mustard has any injurious action on the constitution. It is not recommended, or even suggested, that mustard should be given throughout the year.

At the recent Royal Show in England, the Editor of our contemporary had a conversation on the subject of the mustard test with the successful Orpington and Wyandotte fancier, Mr. H. Fildes, of Mobberley, Cheshire. Having been for years an advocate and user of mustard for poultry, he was asked to write his experience of its action for publication in *Monthly Hints*. His testimony is as follows:—"With regard to our conversation about mustard-feeding, I may say that I have used it largely for winter feeding during the last fifteen years or so. My attention was drawn to it by the avidity with which the hens devoured the table scraps with mustard on them. I gave them more, and found a decided increase in the number of eggs, and as the fowls set aside for winter laying are the culls from my exhibition stock I do not consider the effect on their health so long as I get plenty of eggs, but I can certainly say that I have not had one case of ill-health that could be traced to the mustard feeding (and I have used it freely). What the after effects might be I am unable to say, as I always sell out this portion of my stock to the Jew dealers before Easter, but they have invariably been plump and made a good price. The breeding pens I do not stimulate at all, as I prefer fewer eggs and less risk of infertility. Though I do not wish to infer that mustard might not answer here also, I simply have not tried it. In conclusion, let me say that if I were a 'utility man' solely I would use mustard in very considerable quantities."

Turning to the latest files of the *Australian Hen*, it is noticed that Messrs. G. Shrimpton & Sons, of Sydney, have prepared a little book on the subject of "Feeding Mustard to Fowls," which they are distributing gratis to poultry-breeders. Commenting on this, the practical Editor of *The Hen* says: "We have long known that mustard stimulates the digestion, and thus the egg production of fowls, the late Mr. W. Cook being greatly in favour of its use in the months of egg scarcity and for bringing the pullets on to lay early." It would be interesting to know whether any poultry-men in this country have used mustard in connection with the feeding of their poultry and what they think of it. Perhaps some of our readers will favour us with their views.

Deep Draining for Sugar Cane.

Mr. H. C. Sampson, the Deputy Director of Agriculture for the Southern Division of Madras, has the following useful advice to offer on the advantages of deep draining for sugar cane:—Do not necessarily choose your best land for cane cultivation but rather select your best drained land or land which has the best facilities for drainage. Manure can always be applied for such a profitable crop as this and in such a soil full use is made of it by the crop. Such a land will naturally be a deep soil and will not be at all saline and most probably it will contain a fair proportion of sand. However well the soil it naturally drained it is most essential that neither rain nor irrigation water should be allowed to stand on the surface. Hence it is always essential to dig drains and to do this it is essential that the canes should be planted in rows so that the drains can be continuous and arranged so as to lead into deeper main drains. This also enables one to dispose of the soil removed from the drain which can be utilised in earthing up the canes. The practice of planting in rows, digging trenches and earthing up is a common one in many cane growing districts, but it is seldom that the drains are dug deep enough or that suitable arrangements are made to carry off the drainage water. In many places the rows are so close together that it is impossible to dig deep drains, but the crop will be just as heavy, if not heavier, if the rows are 3—4 feet apart instead of $1\frac{1}{2}$ — $2\frac{1}{2}$ feet.

As to the depth of the drains, which are also the irrigation channels, Mr. Sampson continues, this must vary according to circumstances. I have seen excellent crops of canes with drains 3 feet deep, so deep that the irrigation water is never allowed to come within $2\frac{1}{2}$ feet of the surface of the ridges. In well drained soils where water does not stand after irrigation probably $1\frac{1}{2}$ —2 feet is ample, and on light sandy soils even less, but irrigation water which is led into the drains should never,





A RELIC OF THE 1905 BLIZZARD.

The remains of what was once a fine avenue of trees, the approach to Mr. P. H. Campbell's house, at "Blink Bonnie," Chase Valley, are here shown. The great blizzard of May, 1905, ruined the avenue, and Mr. Campbell accordingly planted Mangoes. Frosts killed these off, and then he decided to plant Oranges, which he did in 1907. Some of the trees bore good fruit last year, and a good many this season. In the photo, the remaining tree of the original avenue is shown, standing as a sentinel and a reminder of a great storm.

after the crop has been finally earthed up, be allowed to come within a foot of the top of the ridge and on heavier soils a greater depth would be better.

Moss Packing for Fruit, etc., to Cape.

The Acting Under Secretary for Agriculture, Natal Province, has received the following telegram from the Department of Agriculture in Pretoria:—"As Natal moss used for packing fruit trees, etc., is grown in kloofs where cattle frequently graze, the Minister has decided, in view of the danger of introducing infective ticks, to prohibit moss as packing for fruit, plants, or trees consigned to the Cape. Kindly notify the public."

Mr. Pitchford's Second Report on Dipping.

The attention of readers is directed to Mr. Pitchford's Second Report on Dips and Tick-Destroying Agents, which appears in the present issue of the *Journal*. This report has been published in pamphlet form and a limited number of copies are available for distribution. Application for the same should be made to this office.

Cattle Buyers' Permits.

The following Notice appears in the *Gazette*, under date 13th August:—"All cattle buyers' permits issued by the Department of Agriculture (Natal Province), under Natal Act No. 32 of 1908, are hereby cancelled, with effect from the 1st of September, 1910, inclusive, and any person thereafter purchasing cattle under the authority of a permit issued prior to that date will be guilty of a contravention of the above-named Act. On and after the 1st of September, 1910, permits will only be issued for the purchase of cattle required for immediate slaughter for the supply of meat for consumption in the Province of Natal, and applications for such permits should be made direct to the Magistrates of the Divisions in which the applicants desire to purchase the cattle, who will forward them to the Acting Under Secretary for Agriculture, Pietermaritzburg, with their recommendation."

Maize Competition.

At their last annual show (in March) the Bloemfontein and O.F.S. Agricultural Society held a maize competition for a special prize of £20 given by De Beers Consolidated Mines, Ltd.; and readers may remember our drawing attention to this competition as early as June and July of last year. We have now been asked by the Secretary of the Society to state that a similar competition will be held in conjunction with next year's show and to advise farmers who may think of going in for it to

keep the necessary samples of their last crop. In this connection farmers had the idea last year that only the current crop—1909-10—would be allowed to compete, but this is not so: in fact, it is because the previous season's crop can be drawn upon and because farmers will require to be advised of the competition early in order to be able to save the necessary samples of this season's crop that the Secretary is thus early asking us to draw public attention to the matter. We recommend all interested to write for particulars to the Secretary (Mr. C. McG. Johnstone), whose address is 14, Board of Executors' Buildings, Bloemfontein.

An Ostrich Feather Show.

The attention of readers interested in any way in ostrich farming is called to the advertisement of the Middleburg (C.C.) Agricultural Society, appearing in this issue, relative to the Ostrich Feather and Poultry Show which they intend holding at Middleburg on Wednesday, 19th October, 1910. The Secretary of the Society (Mr. J. S. Minnaar) informs us that it has been found that during March and April it is not a very desirable time to hold feather shows in the Cape Province, and as most of the plucking takes place during August and September the Society has decided to hold yearly shows in October. From an ostrich farmer's point of view the show will be a most interesting and instructive fixture, as demonstrations on the various phases of ostrich farming will be given, and Professor Duerden, the well-known authority, will lecture at the show. Reduced railway fares will, we understand, be charged in the Cape Province.

Arab Stallion.

A Durban reader writes us as follows:—"Having an Arab mare which I am thinking of breeding from, I am on the look-out for a pedigree Arab stallion. I have not been able to hear of one near here, and Mr. Mowbray, the Secretary of the Agricultural Society here, thinks you might be able to tell me what Arab stallions there are in Natal and where they are domiciled. I should be much obliged if you could give me any information on the subject." We have written to our correspondent, but we should be glad also to hear from any of our readers who may possess Arab stallions or who know of anyone else in possession of them.

"Disease of the Horse."

We have received intimation of the issue of a second and enlarged edition of the late Dr. Hutcheon's well-known work, "Diseases of the Horse," published under the auspices of the Cape Government. The

price of the book is four shillings, and the work is published both in English and Dutch. Persons desirous of obtaining copies should write at once to the Acting Under Secretary for Agriculture for the Cape Province, Capetown.

Horse-Breeding Rules.

Mr. Robert Pratt, J.P., once laid down several rules to be observed in the breeding of horses. His nine **negative** rules were laid down as things to be carefully avoided and **guarded against**. His five positive rules pointed to those things which are to be selected and chosen. The several rules are as follows:—*Negative*.—(1) Unhealthy or unsound animals should never be used. (2) Ill-tempered animals should never be used. (3) Parents that are generally dissimilar in their breed and shapes should be mated to breed. (4) Great big stallions and small mares should never be mated to breed. (5) Half-bred stallions of any breed should not be mated. (6) Avoid breeding in-and-in. (7) Do not breed from coarse, loose-made mares or horses. (8) Do not breed from black or grey mares or horses. (9) Do not breed from mares and horses which, having bred, produced bad colts.

Positive.—(1) Determine exactly in your own mind the character of the horse you wish to produce, and never lose sight of it. (2) Avail of any opportunity that offers to procure the finest animals and blood that will suit your purpose. (3) To breed half-bred horses, select a pure thoroughbred horse and a big half-bred mare, the better bred she is the more valuable she will be. (4) To breed weight-carrying hunters, select a neatly-made, large, roomy, healthy, young, well-shaped, sound, well-bred mare, with good temper and good action, or a tried mare that has been successful. (5) To breed weight-carrying hunters, select a pure thoroughbred stallion, compact, well-shaped, sound, healthy, vigorous, with good temper and good action, and one that is the sire of good running horses, and that has got good weight-carrying hunters.

Technical Knowledge and the Farmer.

A Co. Waterford farmer contributes an interesting note to the *Dublin Farmers Gazette* on "How Technical Knowledge helps the Farmer." Fifty years ago, he says, it was possible for a farmer to conduct his business in a fairly satisfactory manner with very little more education than could be obtained at a National School and on his farm. At present, however, this is not the case—a farmer may be a most excellent ploughman; may be expert in the art of stacking and thatching; may be fully at home in all the details of the practical side of farming, and yet

may lose money daily on account of his want of knowledge of "technical agriculture." His skill in ploughing will be of little aid to him when he tries to value his manures according to their analyses; the neatness of his thatching will not avail when he is considering the percentage germination of his grass seeds. We thus see that, all important as is good practical knowledge and experience, something more than mere practical knowledge is required in this twentieth century.

The writer then proceeds to give an illustration, which arose in this county last year, of the value of a little technical knowledge. A neighbour of mine, he says, a good tillage farmer, I think it may be safely said as good as there is in this county, asked the Agricultural Instructor to value a potato manure which he had bought at £8 10s. per ton. That gentleman found that according to the analysis given it was only worth £3 10s. per ton. Here an excellent practical man had lost no less than £5 per ton on his potato manure owing to his want of knowledge of technical agriculture. Thus we see that at least two qualifications are needed to make a really successful farmer in these days of ruthless foreign competition—practical experience and technical training. Further consideration will soon reveal to us, however, that a third is equally important, *i.e.*, business ability. Farming, in addition to being an art and a science, is also a business, and probably this last factor is quite as important as the other two when financial results are to be considered. The practical side of farming is very well developed in Co. Waterford. I think I may say, without boasting, that we have some of the best tillage farmers in Ireland. But, in spite of this, any farmer travelling along the roads can soon see much that is inferior in the cultivation of the fields around. It is the aim of agricultural instruction to induce the ordinary farmer to raise his standard until he reaches or surpasses that set up by the first-class farmers amongst us.

If there are more chickens in a brood than the hen can well cover when partly grown, greater care will be necessary in providing them with a warm house and nest, and in feeding them by candlelight the last thing at night. Warmth, however, is greatly promoted by proper food; for, however comfortable their house, without the beneficial warmth produced by frequent, regular and nutritious feeding, early broods will never thrive.



THE SOY BEAN PLANT,}

(See Article by Mr. H. J. Choles in present issue.)

Soy Beans : Their Cultivation and Uses.

A NEW NATAL INDUSTRY.

By H. J. CHOLES.

IN the issue of the *Natal Agricultural Journal* for November, 1908, I contributed an article on the Soy Bean, in which I expressed the opinion that this crop was one that had not received the attention in Natal that it deserved, and in which I advocated its cultivation on the grounds of (a) its value for stock-feeding purposes, and (b) its value as a soil-renovator (being a leguminous plant). I called attention to it because I considered it to be a crop which ought to find a worthy place in our agricultural system, and especially on those farms where a more intensive system of agriculture was beginning to be practised. I had seen soy beans growing luxuriantly at Cedara—whose soils are none too rich—and I knew that they would do well in many—I think I am safe in saying in most—parts of Natal. Valuable, however, as I knew this crop to be at that time, little did I think that in less than two years' time I should be able again to advocate its cultivation and this time on entirely different grounds, and grounds which appeal more readily to farmers in this country. Since I wrote then a most surprising development has taken place in the world's feedstuffs market, in the shape of an enormous and increasing demand in England and elsewhere for the grain of the soy bean plant. There has been nothing in recent years more astonishing than the development of this trade; and the rapidity with which it has grown may be judged from the following statement which I have taken from the *African World* of the 23rd April last:—

“Up to the year 1907, so far as can be ascertained from the only Customs figures available, *viz.*, those for the port of Newchwang, the export of soya beans from Manchuria did not exceed 120,000 tons annually. During the year 1908 the export rose to approximately 330,000 tons; one half of this was exported from Darien, and of the remainder 100,000 tons were shipped from Newchwang and 65,000 went out by rail *via* Suifenho *en route* to Vladivostock. This increase was almost entirely due to the demand from Europe, which continued throughout 1909, and seems likely to increase rather than diminish. Taking the Customs figures from October, 1908, to June, 1909, no less than 660,000 tons of beans left Manchuria, 341,000 tons from Darien, 177,000 from Suifenho and 142,000 from Newchwang. Beans were still being shipped throughout July and August, so that the total of last year's crop exported may be estimated at between 700,000 and 800,000 tons. At present prices—

say, £6 10s. per ton laid down in London—experts estimate that Europe can take annually no less than 1,000,000 tons of beans, and there is little doubt that at this price the supply would be available. The bean-cake exports in 1908 amounted to 500,000 tons, and from October, 1908, to June, 1909—i.e., the 1908 bean crop—the export rose to 570,000 tons.”

Natal is specially concerned in this new development—or, I should say, in this recognition of the value of the soy bean as an oil-producing plant—by reason of the establishment by Messrs. Lever Bros., the famous English soap manufacturers, of a branch factory in Durban during the last few months. On the occasion of a visit to Durban recently I called upon Messrs. Lever Bros.’ local manager and was introduced to Mr. A. Grenville Turner, who is an authority on soy beans and oil-yielding plants generally. In the course of a long chat with Mr. Turner I learned that Messrs. Lever Bros. are prepared to take all the soy beans that our farmers can produce for years to come, and that they are doing everything they possibly can to induce farmers in Natal to take up the cultivation of this crop.

When it is considered that this firm alone can take all that Natal can produce, no advocacy of the cultivation of soy beans in a country such as ours, to which they are well suited, can be regarded as too strong; and when the great demand which also exists oversea is considered too, and when, in this connection, it is realised that a large London firm has been inquiring through Mr. J. Reynolds Tait, of Durban, for soy beans and is willing to take as much as £50,000 worth annually starting at once,* then it will be nothing wonderful if some of our farmers seriously consider the advisability of dropping mealies altogether and taking up soy beans as their main crop. Whilst I would be among the last to recommend such a course on any farm on which the cultivation of mealies pays and yields a sufficient return on the capital value of the land, at the same time I think on many farms soy beans and mealies could be grown side by side as the two main crops, with, financially, very good results, and with much less risk of loss than when one main crop only is grown—namely, mealies. In the United States it is quite a common practice to grow ordinary beans and mealies in alternate rows on the same field, the main idea, of course, being that the beans, as a leguminous crop, increase the nitrogen content of the soil and so improve it for future crops. The same practice might well be followed here; and the beans (the seed is perfectly round) might be sown with a drill, the fertiliser—which is the same as that required for mealies—being sown along with the seed just as is done on most farms with maize.

* I have this fact personally from Mr. Reynolds Tait himself.—H J C.

This, however, is really only a matter of detail, to be decided by each farmer according to his own ideas and resources. The main points are that the soy bean requires just about the same cultivation as the ordinary field bean, that it will grow well in Natal, and that there is a large market for the grain. As regards the returns, all I can do is to give the yield per acre and the present price per ton and so calculate the gross return per acre. Readers will then be able to calculate for themselves what the net profit to them will be, by deducting cost of seed, fertiliser (about 180 or 200 lbs. of superphosphate to the acre) cultivation, according to district, and transport to Durban. According to American official publications the yield in that country runs from 1,500 lbs. to 2,400 lbs. of grain per acre. At Cedara up to the end of 1905-6 season the highest yield obtained was 1,252 lbs.* The Cedara soils, however, are admittedly poor, and I think on good soil we can expect quite 1,500 lbs. in this country. I will, however, take the Cedara yield as the basis of calculations. The present price of soy beans in England is £6 10s. per ton. A yield of 1,200 lbs. will thus bring in a *gross* return of about £3 10s. per acre, from which, as I have said, the cost of production and freight to Durban must be deducted. This return, it must be remembered, is a low one, and I think it quite possible that a considerably higher one could be obtained in most localities.

But apart from its value as a grain-yielding plant, the soy bean is a very valuable fodder plant. Cut just when the pods are fully formed, it makes most nutritious hay, the chemical composition of the straw surpassing in nitrogenous value that of wheat, lentils, and hay; while the chemical composition of the bean, according to Professor Kirch, places it above all other pulses as an albuminous food. The following composition of the bean is given by Professor Church: "In 100 parts of the bean, water 35.3, starch and sugar 26, fat 18.9, fibre 4.2, ash 4.6. The nutrient value is 105."

The plant stands drought well and is not easily injured by excess of moisture. Little cultivation is needed when grown for forage. The soy bean may be used for soiling, pasturage, hay and ensilage, or the beans themselves may be harvested and fed as grain. As the analysis given above shows, the forage is very rich in fat and muscle-making material, so that it forms a very useful addition to fodder meals, sorghum and other feeding stuffs rich in fat-forming nutrients. The seed can be fed to the best advantage when ground into a meal, and is almost without equal as a concentrated food. In China and Japan the oil is used extensively as an article of food; and the cake after the expression

* *Natal Agric. Journal*, XI, 6:—"The Place of Legumes in our Agricultural System," E. R. Sawyer.

of the oil comprises an extremely rich cattle food containing, according to Professor Church, 40 per cent. of flesh-forming meals and 7 per cent. of oil. The soy bean furthermore is excellent for green manuring and for short rotation with cereal crops.

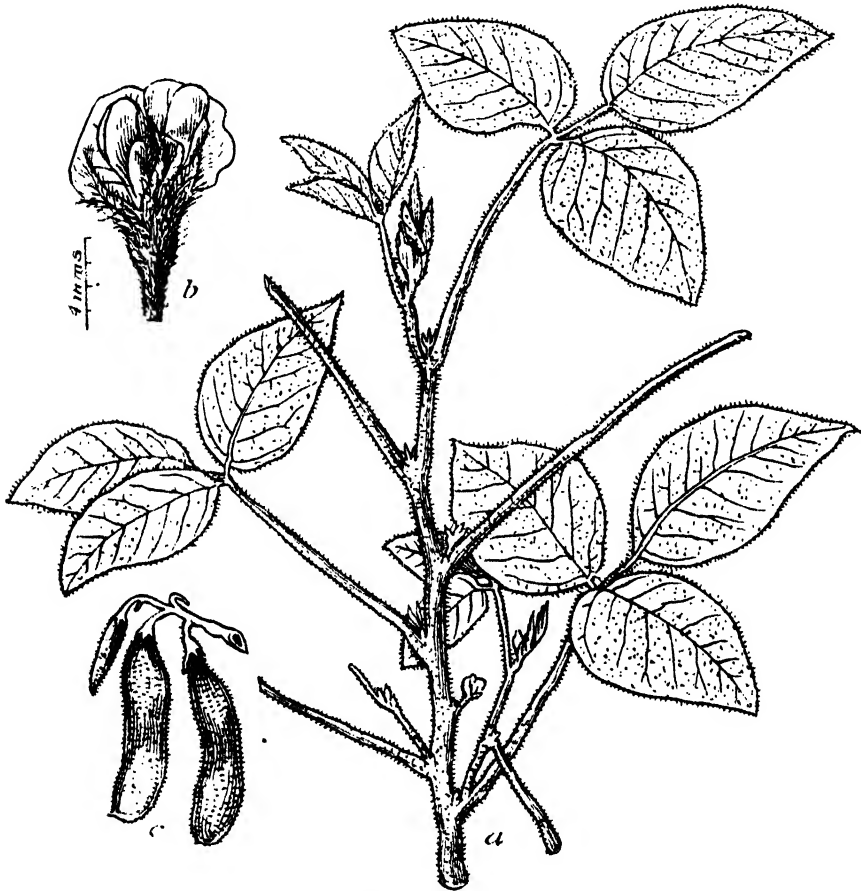
In the preparation of this article I have used much of what I wrote in my previous article—and which, as I therein stated, was based upon information collected from various authorities, including a very useful "Farmers' Bulletin" issued some years ago by the United States Department of Agriculture and Dr. Watt's "Dictionary of the Economic Products of India"; and I am also indebted to Mr. A. Grenville Turner, of Messrs. Lever Bros'. Durban establishment, for much useful information. The illustrations published in conjunction with this article are taken from Farmers' Bulletins issued by the United States Department of Agriculture.

I.—BOTANY AND HABITAT.

The soy bean (or soya) is known to botanists as *Glycine hispida*, Linn., *Soja hispida*, Mönch, and *S. angustifolia*, Miq. It is often popularly known as the "soja" bean, but this name is incorrect. The term "soy" applied to this bean is derived from a Japanese word, *soyu*, denoting a preparation from the seeds which is a favourite article of diet in Japan.

The soy bean is a leguminous plant native of South Eastern Asia. De Candolle says that it originally occurred in the wild state in the region "from Cochinchina to the south of Japan and to Java." It has been cultivated from very ancient times, and in some countries, notably Japan, it is a very important food plant, and its cultivation has reached such an advanced stage that innumerable varieties and forms have been developed. Professor Rein says it is the most important legume in extent of varieties, uses, and value grown in China or Japan. It is supposed to have been used for food in China even before the time of Confucius. Although it has been grown in China and Japan for such an extended period, its cultivation seems to have spread very slowly to the surrounding countries. Its introduction into India seems to have taken place in comparatively modern times. More recently it was brought to Europe, where it was grown in botanic gardens for more than a hundred years without attracting attention as a plant of much economic importance. Aiton says in his *Hortus Kewensis* that it was first brought to England in 1790. In 1875 Professor Haberlandt began an extensive series of experiments with this plant in Austro-Hungary, and in a work published in 1878 he gave the results of his studies and strongly urged the cultivation of the soy bean as a food plant for both man and beast.

Although he succeeded in exciting a great deal of interest in its cultivation while making his experiments, and distributed a considerable amount of seed very little seems to have come of it: for at his death, which occurred in 1878, the interest flagged, and the soy bean has failed to obtain the place as a staple crop which he prophesied for it.



THE SOY BEAN.

Showing flowering branch (*a*), flower (*b*), leaves, and (*c*) pods.

The soy bean is an erect, annual plant, with branching, hairy stems, trifoliate, more or less hairy leaves, rather inconspicuous pale lilac or violet coloured flowers, and broad, two to five-seeded pods, covered, like the stem, with stiff, reddish hairs. The seeds vary in colour from whitish and yellowish to green, brown, and black; and in shape from spherical to elliptical and more or less compressed. Under favourable conditions the plant may reach a height of 4 feet or more. In Professor Haberlandt's experiments in Austro-Hungary the plants bore about 200 pods and 450

seeds each, and though this is probably considerably above the average, it shows them to be remarkably prolific.

The fact that the flowers are self-pollinated makes the yield entirely independent of insects, and renders the soy bean free from an important obstacle in the way of the introduction of many legumes into new regions. A crop of seed is insured wherever conditions are such as to allow the plants to make the proper vegetable growth and reach maturity.

VARIETIES.

According to Mr. Turner, there are over 200 varieties of soy beans, but the most suitable for commercial purposes and the one which the soy bean trade prefers is the "yellow" variety. The different varieties of soy bean are distinguished largely according to the colour, size, and shape of the seed, and the time required for the plants to reach maturity. They also differ more or less in the habit of growth and in the character and degree of the hairiness of the various parts of the plant. The early varieties generally fruit more heavily in proportion to the size of the plant than the later ones, and hence are better to grow for seed, while the medium or late varieties are better for forage on account of the larger yield of fodder that may be obtained.

Liardet says that, under average conditions, the yellow variety will grow from three to five feet high, depending principally on the character of the soil. "Ordinarily it requires from 120 to 150 days to mature a crop of seed. The yellow bean yields well in both grain and roughage and is satisfactory for both. It is a most exacting variety about depth of planting, and under no circumstances should the seed be planted more than two inches deep. The habit of growth is such that it can readily be harvested with machinery and it is frequently gathered with a grain binder."

Of other leading kinds, "Medium Early Green" is one of the best varieties to plant for hay, as it yields heavily and retains its leaves well. For soiling or for ensilage "Medium Early Green," "Medium Early Black," or the "Late" green or black varieties may be used, according to the length of the season and the time at which the crop is to be used. For green manuring the large medium or late varieties are best; "Medium Late Black" being excellent for this purpose. Of the numerous varieties which have been experimented with at Cedara, with a uniform manuring of superphosphate, the following are cited by Mr. E. R. Sawyer as having given the best results, in order of merit:—Early Green, Yellow Seeded, Black Seeded, Giant Yellow, Santa Margherita. Brown seeded and Giant Samarow failed.*

* *Natal Agric. Journal* XI. 6, p. 690.

II.—CULTIVATION.

CONDITIONS OF GROWTH.

It is believed in Japan that soils of a rather strong character are best adapted to the soy bean. In both Europe and America it has been found to thrive best on soils of medium texture that are well supplied with potash, phosphoric acid, and lime. It succeeds very well, however, on comparatively light soils, often giving an abundant crop on soils too poor to grow clover. Professor Haberlandt found that good results could be obtained in Europe on a very great variety of soils, and similar results have been obtained in the United States. Professor Georgeson has obtained fairly good results in Kansas on very poor soils, and under very adverse conditions as to the moisture. In South Carolina the soy bean gives excellent crops on sandy, limestone, or marly soils, and also on drained swamp or peaty lands that are well marled. Experiments in both Europe and America show that the soy bean possesses excellent drought-resisting qualities, enduring dry weather much better than the ordinary field or garden beans.

The soy bean requires about the same temperature as mealies. Professor Haberlandt found that the earlier varieties of soy bean would mature in Europe rather farther north than the earlier varieties of maize. As a general thing, the soy bean is not so easily injured by frost as the common field or garden varieties of beans, and hence it can be planted earlier in the spring and can also be left in the field later in the autumn. At the Kansas Experiment Station, soy beans planted on the 25th July on poor soil survived several light freezes, and, when cut on the 15th October, had matured a fair crop of seeds.

While the soy bean is possessed of excellent drought-resisting qualities, it at the same time seems to be able to survive a period of excess of moisture better than cowpeas or even mealies. Mr. Robert C. Morris, of Illinois, reports, as an instance in his own experience in 1896, that, after standing in water for three weeks in July, the soy beans recovered, while mealies and cowpeas under the same conditions were permanently injured. The upright bushy habit of growth gives the soy bean a great advantage over the cowpea during wet weather and makes it easier to handle at harvest time.

METHODS OF CULTURE.

In a general way, the same methods of culture may be recommended for the soy bean as would be given to the ordinary field bean. The soil should be well prepared, so as to afford a good root bed, and should be left smooth and free from clods in order to facilitate the cultivation and harvesting of the crop. If the soil is lacking in potash and phosphoric acid, these should be supplied to secure the best results. The results of

experiments at Cedara in 1904-5 appear to indicate that phosphoric acid is the principal requirement of the soy bean on soil similar to that of the Experiment Farm. In those particular experiments the highest yield was obtained from the application of superphosphate at the rate of 180 lbs. to the acre. Basic slag came next, the rate of application being the same.* From experiments carried on at the Massachusetts Hatch Experiment Station, it is probable that for this crop the potash (when required) can be best supplied in the form of the muriate. Under ordinary conditions it is not likely that there will be any necessity for using any nitrogen-containing fertiliser, as sufficient of this element is usually present in the soil, and, like other legumes, this plant assimilates the free nitrogen of the air. In experiments with this crop where nitrogen has been supplied to the soil in various forms, it has been found that there was but very little gain in the yield, and in but very few instances was this sufficient to pay for the extra fertiliser used.

Although soy beans may be planted quite early in the season, the best results will be obtained if the seeding is postponed until the ground has become thoroughly warm; and in case the earlier varieties are used, a fairly good crop of forage or even of seed may be obtained if the seeds are not planted until the earlier small grains, such as rye and barley, have been harvested. It may thus be able to obtain two crops from the same field in a single season; one of small grain and the other of soy bean, and yet to leave the land in better condition than if the second crop had not been grown. Another practice is to drill the beans in between the rows of mealies after the last ploughing. The best method of seeding will depend somewhat upon the kind of crops which it is desired to harvest. If the soil is good, and a crop of hard or green fodder is desired, good results may be obtained by sowing broadcast or with a grain drill. If, however, a crop of beans is desired, it is best to plant in drills from 2 to 3 feet apart, according as the soil is light or heavy.

There is considerable difference in the amount of seed sown per acre in the various localities. Some farmers sow only about half a bushel per acre, while others prefer a bushel or even more. The proper amount will necessarily vary somewhat, according to the method of seeding and the character of the soil. As a rule, when grown for seed, from one-half to three-fourths of a bushel per acre will be ample. When put in with a grain drill or sown broadcast, a greater amount of seed will be required; but in any case it will hardly be necessary to use more than one bushel per acre. Of course, less seed will be required when the grain drill is used than when the seed is sown broadcast; as a rule, better results will be obtained. When planted for beans enough seed should be

* E. R. Sawyer: "Place of Legumes in our Agricultural System," *Natal Agric. Journal*, XI, 6.

used to give an average of from four to six plants per foot in the row, so that the plants will be two or three inches apart. If nothing better is at hand for planting the seed, an ordinary grain drill, with enough of the holes stopped up to give the desired distance for the rows, may be used. For example, if the holes are 8 inches apart, number 1 may be left open, numbers 2, 3, and 4 closed, number 5 open, etc., and the rows will be 32 inches apart, or if a less distance is desired, number 4 may be left open and number 5 closed, and the rows will be 24 inches apart. In very light soil the latter distance would probably be best, but in heavier soils the former would be preferable.

When the seed has been drilled in rows close together, or has been sown broadcast, very little cultivation will be necessary. It will sometimes be found advisable, however, to cultivate the drilled field soon after planting, as, in case the land is very foul, the weeds are liable to get such a start that they will interfere with the growth of the young soy plants. For this purpose use a light harrow. When grown for seed, thorough cultivation should be given, at least while the plants are young. As a rule, cultivation should be shallow and frequent if the best results are to be obtained. When the ground is inclined to pack or bake, it should be stirred after each rain, but care should be taken not to work the field when the plants are very wet from rain or dew. If the drills have not been made too far apart, it will be found that the plants will soon shade the soil sufficiently to keep the weeds in check and to keep the surface in good condition, so that not much cultivation will be necessary. In fact, on good soil very fine crops have been obtained with but a single stirring of the soil after the seed had been planted. As a rule, this crop will require a smaller amount of cultivation than mealies.

SOY BEAN MIXTURES.

Soy beans may with advantage be mixed with other crops, such as cowpeas, sweet sorghum, mealies, etc. The commonest mixture is with mealies. The best method of planting for this country will probably be in alternate rows—first mealies, then soy beans, then mealies and so on. This is especially a good idea where both the green maize stalks and bean plants are to be used for feeding purposes, as in this way a very nutritious and a fairly well balanced mixture is obtained. Soy beans and cowpeas also form a good mixture—and a better feed than either crop alone, as there is variety in the feed. In planting these two crops together in mixture, about a bushel of soy beans to half a bushel of cowpeas per acre should be used. If they are planted in rows, only about half the quantity of seed in each case will be required. This mixture has the further advantage of being more easily cured as hay than is the case with cowpeas, although it is a little more difficult than with soy beans alone.

III.—HARVESTING.

WHEN TO HARVEST.

The time for harvesting the soy bean will necessarily depend somewhat upon the use for which the crop is intended. From the analyses given in the following table it will be noticed that the plants, cut when the pods are well developed, contain larger amounts of crude protein and fat than those cut at early stages. But from feeding experiments it seems likely that more of the plant will be eaten if cut in the earlier stages, and hence it is doubtful if very much is gained by the latter cutting. Considering palatability and digestibility as well as chemical composition, it is probable that the best forage will be obtained by cutting just as the pods are forming.

Composition of the Soy Bean at Different States of Growth.

Water-free Substance.	Whole Plant (just in bloom) August 21st.	Stalk of preceding.	Whole Plant (just in pod)	Whole Plant (pods well de- veloped, but not hard.)
Protein	12.84	3.38	14.41	14.43
Fats	2.57	0.80	3.78	3.85
Nitrogen-free extract ...	50.05	9.25	46.83	55.70
Crude Fibre	27.31	81.34	28.20	20.38
Ash	7.23	5.23	6.78	5.64

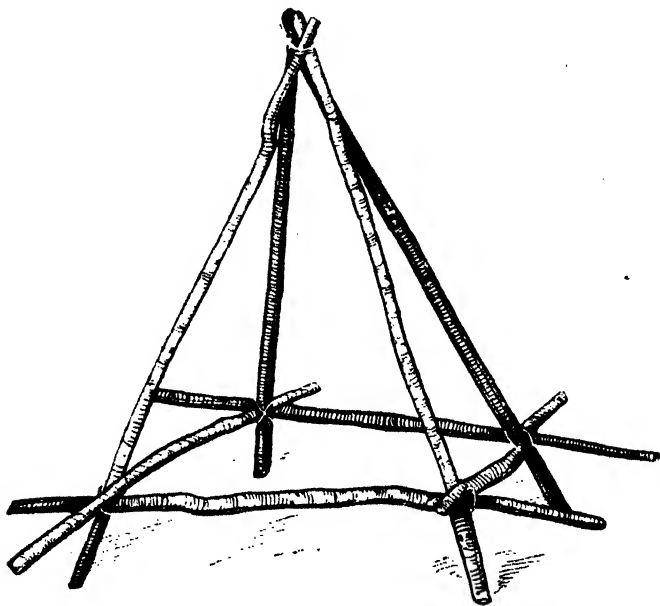
If the crop is to be used for soiling purposes, cutting can begin when the plants are in early bloom and can be kept up until the pods are beginning to ripen, though the length of the season will vary somewhat, according to the different varieties, some being better for this purpose than others. If the crop is to be cured for hay, it may be cut when the plants are in full bloom or the pods beginning to form, but this will also vary according to the variety grown, since some of the varieties begin to drop their leaves much earlier than others, and it is quite important that as many of the leaves should be saved as possible. It will be noticed from the preceding table that in the stalk of the plant the percentage of protein and fat is very low, and that of the crude fibre is very high; hence most important of the food elements are found in the leaves.

When the crop is to be preserved in the silo, it will be best to cut it at about the same stage as when used for hay. However, the plants can be cut at a later stage for the silo than for hay, since they are preserved in a much more palatable condition than when cured as hay, and the cutting necessary in preparing for the silo leaves the plant in condition to be more easily masticated by the animals.

CURING.

Because of its coarse habit of growth, the soy bean is somewhat difficult to cure satisfactorily in most climates. A good plan to follow in

curing is to allow the plants to lie in the swath or wind-row until well wilted (but not until they begin to become brittle), and then gather into small piles. Care should be taken to see that these piles are so constructed as to admit of thorough ventilation to the very centre, in order that the plants may not mould and spoil. The hay should be handled as little as possible in curing and carrying to the barn or shed, in order that the leaves may not be broken off and lost.



FRAME FOR CURING SOY BEAN HAY.

Curing frames can often be used advantageously in connection with the making of soy bean hay. The accompanying illustration (reproduced from Messrs. Lever Bros'. pamphlet on Soy Bean Cultivation) will show what these frames are like. The poles should be anything from three to six feet long. The use of these frames has the advantage of keeping the cocks open, thus preventing matting and admitting air freely.

HARVESTING FOR SEED.

Under ordinary conditions the earlier varieties will mature in 75 or 90 days from the time of planting, but, as stated earlier in this article, the yellow variety (the most suitable for commercial requirements) usually requires from 120 to 150 days for the maturing of the seed. It is possible, however, and often even desirable, in harvesting the crop for seed to cut before the pods are entirely mature. If they become too ripe, they are liable to burst open in drying and carrying to the machine, and thus a portion of the seed may be lost. Some growers recommend

cutting for seed when the pods are only about half mature. This is undoubtedly a good practice if the straw is to be used for feeding purposes, as in that case it will contain a larger amount of digestible nutrients, and will be much more palatable than if allowed to stand until the pods are thoroughly mature.

The plants should be allowed to dry before they are stacked, but on the other hand they must not be too dry, as there is then danger of the seed shattering.

In harvesting a crop for the seed, the plants may be pulled by hand or cut with a scythe or mower and gathered into small piles, which should be relatively high and of small diameter, so that the plants may dry out readily. Thrashing can be done with a flail or with the thrashing machine. Very good results can be had with common grain thrashers by taking out a portion or all of the canvas and substituting blanks.

In storing soy-bean seed great care must be taken to prevent heating. The grain should be thoroughly dry, and there should be plenty of ventilation where it is stored. Occasionally, too, it should be examined to see if it is keeping well. It is stated that soy-been seed is rarely attacked by weevils.

If the grain is stored for seed purposes it should not be kept for longer than one season, as even with the greatest care it is liable at times to heat, and the percentage of germination is thus reduced. If it is more than one season old it should be tested to ascertain its percentage of germination, and increased seeding must be made accordingly.

YIELD OF SEED.

Under ordinary conditions in America 25 to 40 bushels of seed per acre is an average yield. At Cedara about 20 bushels has been obtained. If the conditions are favourable, it is stated by American authorities, the yield may reach 100 bushels. On the other hand, drought and poor soil may reduce the yield to 15 bushels or even less. In the experiments by Professor Georgeson, a yield of over 8 bushels per acre of well cleaned seed was obtained from a field planted after a crop of rye had been harvested. In this case the beans were cultivated but once, and grew under very adverse conditions of both soil and climate. This was the second crop from the land that season.

YIELD OF FORAGE.

The amount of forage obtained from the soy bean will, of course, vary largely, according to the conditions under which the crop is grown. Under favourable conditions as much as 12 or 13 tons of fresh fodder may be produced per acre. The early varieties yield, as a rule, a less amount of forage. At the South Carolina Station, yields of 2 to 2½ tons of cured hay per acre are reported, and similar amounts have been obtained in many other portions of the United States. In Japan, the

earlier varieties are said to afford on an average from $1\frac{1}{2}$ to 2 tons of well cured forage per acre. At the North Carolina Station, in an experiment in which the soy bean and the cowpea were grown under similar conditions, a yield of nearly $2\frac{1}{4}$ tons of well cured hay was obtained from one acre of soy bean, while from one acre of cowpea a little less than a ton was secured.

IV.—CHEMISTRY OF THE SOY BEAN.

Analyses of the soy bean, when compared with those of other leguminous crops, show that it ranks high from a chemical point of view. The average composition of the yellow, white, brown, and black varieties is given as follows* :—

	Yellow. per cent.	White. per cent.	Brown. per cent.	Black. per cent.
Nitrogenous Matters ...	34.3	40.5	35.1	34.0
Oil ...	17.7	14.4	17.8	17.1
Carbohydrates ...	28.4	23.5	28.7	28.4
Fibre ...	4.8	4.9	4.5	4.6
Ash ...	5.3	5.1	4.7	4.7

The Consulting Chemist of the Royal Agricultural Society of England, in his annual report for 1909, gives the following analysis of the soy bean :—

	per cent.
Moisture ...	10.41
Oil ...	17.47
Albuminous Compounds* ...	40.50
Soluble Carbohydrates, etc. ...	22.28
Woody Fibre ...	4.21
Mineral Matter (ash)† ...	5.03
	100.00
*Containing Nitrogen ...	6.48
†Including Sand ...	0.20

The following are partial analyses of samples of Natal soy beans made by Mr. W. R. Simpson Ladell, the Chemist at the Government Experiment Farm, Cedara. Mr. Ladell hopes to publish fuller details in the *Journal* shortly :—

(1) *Grown at Nottingham Road.*

Oil = 17.30 per cent.

Acid value of Oil = 3.24, corresponding to 1.62 per cent. of free fatty acids (calculated as Oleic).

(2) *Chinese White Soy Beans (Natal Grown.)*

Oil = 15.66 per cent.

Acid value of Oil = 5.51, corresponding to 2.75 per cent. of free fatty acids.

* *Mark Lane Express*, 23rd May, 1910.

The green fodder has much the same composition as red clover, although slightly lower in crude fibre. In the two most important substances, crude protein and fat, the soy bean is considerably richer than the cow-pea. The hay also shows a relatively high fat and protein content. The only available analysis of soy-bean ensilage shows it to agree very closely in composition with red clover ensilage, being higher in crude fibre and fat, and lower in extract matter. From the analysis of the beans it will be seen that these are about two-fifths protein and one-sixth fat, with but very little fibre present, making them almost as rich in crude protein as the best cotton seed-meal, with a higher percentage of fat. They contain three times as much crude protein and nearly three and a half times as much fat as oats: nearly three and one-half times as much protein and about three times as much fat as mealies, and almost twice as much crude protein and over twelve times as much fat as peas: all of which shows them to form one of the most concentrated of feeding stuffs.

The accompanying table gives an excellent comparison of the yield and composition of soy bean and fodder maize under similar conditions, and shows how admirably the one supplements the other when both are used in the feeding ration. At the Massachusetts Hatch Station, Longfellow maize gave an average yield of 16 tons of green fodder per acre, and Medium Early Green soy bean gave a little over 10 tons. The soy bean, cut when the pods had formed but not hardened, afforded a little over 30 per cent. of dry matter, and Longfellow maize, cut when the cobs were glazed, gave a little less than 28 per cent. The total amounts of the various food constituents produced by each crop on an acre of ground may be seen by the following table:—

Total Amounts in Pounds of Food Constituents Produced on an Acre of Land by Soy Bean and Fodder Corn.

Crops.	Flesh Formers.	Fat and Heat Producers.		
	Protein.	Crude Fat.	Fibre.	Extract Matter
Green Soy Bean ...	1,167.2	233.4	1,418.1	2,430.9
Longfellow Fodder Corn	871.3	290.1	1,626.0	5,616.8

The following tables* have been arranged to show, as far as possible, the latest results obtained in the United States in investigations into the chemical composition and the various kinds of forage made from the soy bean:—

* From Messrs. Lever Bros' Pamphlet.

Chemical Composition of the Various Kinds of Forage Made from the Soy Bean.

Soy Bean Forage.	No. of analyses.	Fresh or air-dry substance.					
		Water.	Protein.	Fat.	Nitrogen-free extract.	Fibre.	Ash.
Fodder (early bloom to early seed) ...	13	76.5	3.6	1.0	10.1	6.5	2.3
Soy bean hay (Japanese) ...	1	16.0	16.9	2.2	23.1	35.9	5.9
Soy bean hay (Mass.) ...	4	12.1	14.2	4.1	41.2	21.1	7.3
Soy bean straw (Mass.) ...	3	11.4	4.9	1.9	37.8	37.6	6.4
Soy bean straw (hulls and vines after thrashing)...	1	5.7	4.0	0.8	36.0	49.5	3.9
Soy bean seed ...	8	10.8	34.0	16.9	28.8	4.8	4.7
Soy bean meal ...	2	10.4	36.0	18.9	27.0	2.6	5.1
Soy bean ensilage ...	1	74.2	4.1	2.2	7.0	9.7	2.8
Maize and soy bean ensilage ...	4	76.0	2.5	0.8	11.1	7.2	2.4
Millet and soy bean ensilage ...	9	70	2.8	1.0	7.2	7.2	2.8

Soy Bean Forage.	No. of analyses.	Water-free substance.					
		Protein.	Fat.	Nitrogen-free extract.	Fibre.	Ash.	
Fodder (early bloom to early seed) ...	13	15.3	4.1	43.0	27.6	10.0	...
Soy bean hay (Japanese) ...	1	20.1	2.6	27.5	42.7	7.0	...
Soy bean hay (Mass) ...	4	16.2	4.7	46.8	24.0	...	...
Soy bean straw (Mass) ...	3	5.5	2.2	42.7	42.4	...	...
Soy bean straw (hulls and vines after thrashing)...	1	4.25	0.85	38.2	52.6	5.3	...
Soy bean seed ...	8	38.1	18.9	32.2	5.4	5.3	...
Soy bean meal ...	2	40.2	21.0	30.2	2.9	5.7	...
Soy bean ensilage ...	1	15.7	8.7	27.0	37.6	11.0	...
Maize and soy bean ensilage ...	4	10.4	3.3	46.3	30.0	...	...
Millet and soy bean ensilage ...	9	13.3	4.8	34.3	34.3	...	...

DIGESTIBILITY.

The chemical analysis alone will not prove the feeding value of a forage crop. Other points must be considered, one of the most important of which is the percentage of digestibility of the various nutrient substances found in the plant at the time it is fed to the animal.

The following rough computation will give an idea of the amount of digestible matter in the forage raised on an acre planted to this crop. Under ordinary farm conditions the yield of green fodder usually ranges from 6 to 12 tons per acre. Taking 8 tons as an average yield, the amount of dry matter will be about 2 tons, of which about 54 per cent. is digestible. This will make the digestible matter raised on an acre of ground amount to nearly 1 and one-tenth tons. Of this amount one-sixth

is protein or muscle-making material, and about three-fourths crude fibre and other fat-forming substances .

Soy-bean meal has a high percentage of digestibility. It contains almost two and a half times as much digestible protein and over five times as much digestible fat as the common roller process wheat bran, and its digestibility is decidedly higher in everything but the fat than that of cotton-seed meal.

The following table gives the percentages of the various food constituents digestible in the fodder, meal, seed, pods, straw, hay, ensilage, and certain mixtures:—

Digestibility of Soy Bean Forage.

Soy Bean Forage.	Kinds of Animals.	No of trials.	Protein.	Fat.	Nitrogen-free extract.	Fibre.	Organic matter.	Ash.
Soy bean fodder* ...	Sheep	8	75.1	54.0	73.2	47.0	64.5	18.9
Soy bean meal and timothy hay* ...	"	8	77.7	73.6	66.2	61.3	69.1	47.1
Soy bean meal alone (calculated from the above mixture)* ...	"	8	85.5	84.9	73.4	...	78.0	21.3
Soy beans (seed)† ...	Ruminants	2	87.0	94.0	62.0	...	85.0	...
Soy bean pods† ...	"	2	44.0	57.0	73.0	54.0	63.0	...
Soy bean straw† ...	"	4	50.0	60.0	66.0	38.0	55.0	...
Soy bean hay ...	"	6	70.0	39.0	67.0	56.0	...	...
Soy bean ensilage‡ ...	Goats	2	76.0	72.0	52.0	55.0	...	...
Corn and soy bean ensilage‡	Steers§	2	55.0	49.0	61.0	43.0	...	...
Barnyard millet and soy bean ensilage‡ ...	Sheep	3	65.0	82.0	75.0	65.0	...	...
...	"	4	57.0	72.0	59.0	69.0	...	...

* Ninth An. Rep. Storrs Exp. Sta., pp. 248, 250 (1896)

† Sixth An. Rep. Storrs Exp. Sta., pp. 160, 161 (1893), taken from European tables by Drs. Dietrich and König.

‡ Ninth An. Rep. Mass. Hatch Exp. Sta., p. 165 (1897.)

§ Very low; probably quite mature when harvested.

SOY BEAN OIL.

The oil content of soy beans varies. Dr. J. Lewkowitsch, in his *Chemical Technology and Analysis of Oils, Fats and Waxes*, mentions 18 per cent. In the article in the *Mark Lane Express* of the 23rd May, 1910, already referred to, an authority (unnamed) is quoted as giving the following as the average oil content of the yellow, white, brown, and black kinds:—Yellow, 17.7 per cent.; white, 14.4; brown, 17.8; black, 17.1. The analysis of Natal soy beans grown at Nottingham Road, referred to above, gave the oil content as 17.30 per cent.

Discussing the chemistry of soy bean oil, Dr. Lewkowitsch* says:—
 "A sample of the oil extracted with ether by Morawski and Stingl gave 0.22 per cent. of unsaponifiable matter, and 2.28 per cent. of free acid

calculated to oleic acid. The proportion of solid fatty acids in the oil is approximately 11.5 per cent. of the total mixed fatty acids; Lane found 80.26 per cent. of liquid fatty acids. The bulk of the solid fatty acids is stated to consist of palmitic acid; the liquid fatty acids consist of oleic and linolic acids. On exposure to air it dries slowly with formation of a thin skin."

SOY BEAN CAKE.

Soy bean cake is made from the residue of the beans after most of the oil has been removed. It is quite possible that the manufacture of this cake will go hand in hand in Natal with the extraction of soy bean oil, and consequently an analysis of the cake will be of interest. The Consulting Chemist of the Royal Agricultural Society of England, in his annual report for 1909, gives the following analysis as representing the composition of a fair average sample of the cake as now imported into England:—

Moisture	...	...	...	11.40
Oil	...	...	...	6.12
Albuminous Compounds*	...	...	...	42.78
Soluble Carbohydrates, etc.	...	...	...	28.41
Woody Fibre	...	...	...	5.70
Mineral Matter (ash)†	...	...	...	5.59
				100.00
* Containing Nitrogen	...	...	...	6.85
† Including Sand	...	...	...	0.37

V.—VALUE AND USES OF THE SOY BEAN.

There are few other crops which can be put to such a variety of uses, in one way and another, as the soy bean can. When I visited Mr. A. Grenville Turner recently in Durban at Messrs. Lever Bros'. offices, to seek additional information with regard to the soy bean, he very kindly prepared for me a list of the uses to which this crop can be put, and the list is so unique that it will be interesting to reproduce it here:—

THE USES OF THE SOY BEAN.

From the grain oil is expressed which is used for different purposes, and the residue after the oil is extracted is also utilised: whilst the grain is also used in various ways as it is without the oil being extracted. The following is a list of the uses to which the oil and the beans respectively are put:—

(a) The Oil is used—

- (1) As a lamp oil (in China);
- (2) As a salad oil;
- (3) As an ingredient of butter substitutes;
- (4) In the manufacture of paints and varnishes;

- (5) In soap-making;
- (6) In dynamite manufacture;
- (7) For lubricating purposes (?)

(b) *The Bean*—The uses to which the bean is put are as follows:—

(1) It is grown in private gardens in Natal, and cooked and used as a vegetable (like marrowfat peas or haricot beans);

(2) As the soy bean contains no starch, a special kind of bread and biscuits is manufactured in Paris for persons suffering from diabetes;

(3) In France and Switzerland the beans are roasted and ground and used as a substitute for coffee (or as an adulterant);

(4) Soy bean flour is used for making bread and biscuits in England, being mixed with wheaten flour;

(5) "Soya meal" is made from the bean and used for cattle feeding purposes;

(6) After the oil has been extracted from the bean, the residue is manufactured into cake for stock-breeding purposes;

(7) A liquid closely resembling cows' milk is obtained, in Japan, by soaking soy beans in water, crushing them, and boiling with water. It has the following average composition:—Water. 92.53; protein, 3.02; fat, 2.13; fibre, 0.03; non-nitrogenous extract, including carbohydrates (galactan), 1.88; and ash, 0.41*;

(8) From the milk prepared as described above a vegetable cheese is made**;

(9) A sauce, called "Shoyu," is made in Japan in which soy beans are largely used;

(10) Soy-bean cake is used as a fertiliser in Japan (where £7,000,000 worth was utilised last year) and China (where it is used in sugar plantations).

This is truly a remarkable catalogue of uses to which the soy bean can be put, and it is doubtful whether there are many other plants that equal it in this respect. Further, besides all these various uses of the bean, the plant itself is of great value; and as the farmer has no interest in the uses of the bean beyond a bare narration of them such as I have given, we will now proceed to examine, at greater length, the value to the farmer of the plant itself apart from the grain.

I.—AS A SOILING CROP.

One of the most important uses of the soy bean other than for the growing of the grain is for green forage. The great variation in the

* Chemical Technology and Analysis of Oils, Fats and Waxes, 1904, Vol. II,

** *Jour. Soc. Chem. Ind.*, XXV. 14.

season of maturity of the different varieties makes it possible to have a succession of forage lasting throughout the greater part of the summer and autumn. Wherever tried it has proved a most valuable forage for milk production. At the Massachusetts Station soy bean fodder gave excellent results in every combination tried. A ration of grain, soy bean and hay gave better results in five out of six cases than a rotation of grain, vetch, oats, and hay, and also exceeded grain and rowen hay. In another experiment, in which vetch, oats, fodder mealies and soy bean were fed in connection with meal, gluten meal, and wheat bran or dried brewers' grains, the soy bean made a remarkably fine showing, especially when fed with the dried brewers' grains. This ration gave the largest average flow of milk in every case. The quality of the milk also improved. This clearly shows that the addition of soy bean fodder to the ration of milk cows will have a beneficial effect upon both the quantity and the quality of the milk. It tends to promote a narrower nutritive ratio, and hence makes a more profitable ration for the production of milk and butter. Soy bean and sorghum make an excellent combination for green fodder: the former is rich in the muscle-making elements and the latter in the fat-forming ones. Both make large yields of forage per acre, and both will thrive under the great variety of soil and climatic conditions.

II.—AS A SILAGE CROP.

A number of experiment stations have conducted experiments in making and feeding soy bean ensilage, and the results have been quite satisfactory. By using the larger, coarser growing varieties a heavy yield of forage may be obtained. The silage keeps well, is eaten readily by stock, and the animals show good results in flesh or milk production. Again, the crop is an easy one to put into the silo as compared with some others that are often used for this purpose.

There are a number of reasons why the soy bean can usually be more profitably ensiled than cured for hay. The ensilage is more palatable than the hay and can be fed with much less waste. There is also usually less loss in cutting the crop and putting it into the silo, owing to the liability of the leaves to fall off during the process of curing and storing the hay. Furthermore, the plants can be ensiled at any time from early blooming to early maturity with fairly good results, while, if cutting for hay is delayed much after the pods are well formed, the quality may be considerably impaired by the stems becoming woody and unpalatable.

Excellent results are obtained by making a mixed ensilage of soy bean and maize millet, or other crops rich in fat-forming nutrients but poor in muscle-makers. The one supplies what the other lacks, and thus a more evenly balanced ration is obtained. All things considered, maize is the best crop that can be used with the soy bean for making such a mixed ensilage. In filling the silo beans and maize may be put down in

alternate layers, and whatever further mixing may be necessary can be done when the ensilage is fed out to the stock. Professor Phelps, of the Connecticut (Storrs) Experiment Station, recommends this mixed silage very highly as an economical feed for farm and dairy stock.

III.—AS A HAY CROP.

There can be no question as to the high feeding value of hay made from soy bean, cut in the right season and properly cured and preserved. Even when the cutting is delayed until the seed is mature enough to harvest, the stem and leaves contain sufficient digestible substances to be of considerable value for forage. Unless the plants are cut in the proper season, however, much of the value of the forage will be lost on account of the woody character of the stems and the falling off of the leaves. It is, therefore, the best plan to ensile the crop if it becomes too mature before it can be cut. On account of its coarseness the hay is not eaten as readily as that of many other legumes, but this may, in a measure, be overcome by running the hay through a feed cutter before feeding it. All things considered, the soy bean cannot be used for hay as advantageously as for soiling or for ensilage. Nevertheless, it may often be profitably grown for this purpose, as, for example, in short rotations and in localities where clover cannot be relied upon.

IV.—AS A PASTURE PLANT.

On some American farms the soy bean crop is often pastured. Although hogs are perhaps most frequently used, all kinds of stock can be pastured on it. The crop can often be fed in this manner to great advantage. The labour and expense of harvesting is saved and the droppings from the animals are of great value to the land. Young stock, particularly sheep and hogs, can be very profitably pastured on this crop. Many farmers maintain that by this method of feeding the land is benefited as much as if the crop had been ploughed under, and they obtain the pasturage in addition.

V.—AS A SOIL RENEWER.

One of the great advantages in growing leguminous forage crops lies in the benefit which the soil derives from the nitrogen and other important elements of plant food that are left in it by the crops. Soils that have become impoverished by continuous cropping with small grains or other nitrogen-using crops may be restored to fertility by the use of leguminous crops, as, for example, the clovers, cowpeas, vetches, lupines, and the soy bean. The value of a crop as a soil restorer depends upon the amount of available plant food which it adds to the soil, and also upon the effect which the roots have upon the mechanical condition of the soil. Leguminous plants, through the aid of the root tubercle organisms, are able to add to the available nitrogen of the soil, and hence are extensively used in restoring soils deficient in that element.

The soy bean is highly valued in Japan as a nitrogen gatherer, and is extensively grown in rotation with cereal crops. When the soy bean was first introduced into the United States it did not form root tubercles, owing to the absence of the tubercle organism from the soil, and it has been grown for several years in some localities without the appearance of



ROOTS OF SOY BEAN PLANT.

Showing Nodules.

any tubercles. In other cases the tubercles have developed in great abundance after a short time. At the Massachusetts (Hatch) Station the Medium Green soy bean produced great numbers of the tubercles. At the same station it was found that liberal application of nitrates interfered with the development of the tubercles.

In experiments made at the Storrs Experiment Station soy beans were planted in soil uninfested with the tubercle microbes, and then later in the season (about the middle of July) a portion of the field was inoculated with infected soil. Tubercles were produced on the plants in the inoculated land, but, owing to the lateness of the inoculation, they made but little development, and no difference could be noticed between the crops grown on the two parts of the field.

The manurial value of a crop of soy beans compares very favourably with that of other legumes commonly grown as green manures. In the following table is given a comparison of the fertilising ingredients contained in the crop and roots produced on an acre by soy beans, cowpeas, and red clover:—

*Yield of Green Forage per Acre, and Fertilising Ingredients in Crop
Roots of Soy Beans, Cow Peas and Clover.*

				Soy Bean.	Cowpea.	Red Clover.
				tons.	tons.	tons.
Green Forage				9½	8	13
				lbs.	lbs.	lbs.
Nitrogen	{ In Crop	...	...	165	67	138
	{ In Roots, etc.	...	...	9	23	44
	{ Total	...	...	174	90	182
Potash	{ In Crop	...	...	109	60	152
	{ In Roots, etc.	...	...	6	15	32
	{ Total	...	...	115	75	184
Phosphoric Acid	{ In Crop	...	...	42	17	32
	{ In Roots, etc.	...	...	2	6	13
	{ Total	...	...	44	23	45

When a crop of soy bean or cowpea is turned under for green manure, it should be well limed. This will obviate the bad effects sometimes experienced when a very heavy crop of legumes is ploughed under.

Though soy beans possess a very high value as a green manure, they do not seem to leave the soil in as good condition when the crop is taken off as do clover and some other legumes, particularly perennials. After considerable experimentation in Massachusetts the conclusion was reached that soy beans failed to enrich the soil sufficiently in available nitrogen to produce as good yields of small grains following them as did the clovers.

VI.—VALUE OF THE BEAN FOR FEED.

There is no other crop so easily grown that is so rich and can be used to such good advantage in compounding feeding rations as the soy bean. Excepting the earth nut, there is no other raw vegetable product known which contains such high percentages of protein and fat in such a highly digestible form.

For feeding to animals the beans should be ground and the meal used with some less concentrated feeding stuffs. Comparatively few experiments have as yet been made in the United States to test the feeding value of soy bean meal. Professor Brooks, in Massachusetts, found that it compared very favourably with cotton-seed meal. Cows fed on soy bean meal gave richer milk and produced a better quality of butter than when fed on cotton-seed meal, but on the latter the cream was richer.

SOY BEANS FOR HOGS.

Professor Georgeson obtained excellent results in feeding hogs on a ration of which soy bean meal was a prominent constituent. His experiments are reported in detail in Bulletin No. 61 of the Kansas Station, but the following brief summary, taken from an article in the *Industrialist* for January 11th, 1897, gives the essential features of his tests:

"It was found . . . that a lot of three pigs which was fed for 126 days on a ration consisting for the first eleven weeks of Kafir corn meal alone and the last seven weeks of Kafir corn meal and shorts gained a total of 191 pounds, while a similar lot fed two-thirds Kafir corn meal and one-third soy bean meal gained 547 pounds in the same time. Another lot of three pigs which was fed on corn meal for the first eleven weeks of the experiment and a mixture of two-thirds corn meal and one-third shorts for the last seven weeks of the experiment made a total gain of 306 pounds in 126 days, while a similar lot of three pigs fed on two-thirds corn meal and one-third soy bean meal throughout the experiment gained 554 pounds in the same time. The largely increased gains in these pigs must be credited chiefly to the soy bean meal."

Another American scientist, Professor Pott, considers, as the result of numerous experiments, that soy beans constitute a good fattening food for cattle, sheep and pigs, as well as being suitable for horses in hard work. In his experiments he obtained a large increase of live weight with pigs, although it should be added that his test was not made with pigs of prime quality. He found, however, that the oil in the bean acts as a laxative, and that it is desirable to limit the quantity of beans in the rations. His experiments were made with the crushed beans without the oil having been first extracted.* Soy bean cakes are, of course, as I have said elsewhere, made from the beans after the oil has been extracted.

Experiments have also been made in America to test the value of soy bean meal in combination with mealie meal and Kafir corn meal in comparison with the two latter feeds alone in feeding pigs. The foods were mixed in proportion of four-fifths maize or Kafir corn to one-fifth soy beans. Larger gains, varying from 12 to 37 per cent., were made in every case on the mixed rations than on maize or Kafir corn alone.**

SOY BEANS FOR DAIRY COWS.

As illustrating the value of soy bean cake for milch cows, an experiment which was carried out last year at the Royal Agricultural College, Cirencester, England, may be cited.† In this experiment, which lasted over a period of four weeks (from April 12th to May 9th, 1909), decorticated cotton cake was used for the purpose of comparison.

* *Mark Lane Express*, 23rd May, 1910.

** Liardet: *Soya Beans*.

† Royal Agriculture College, Cirencester: *Scientific Bulletin* No. 1, 1909.

Six cows were selected from the College herd, and divided into two lots of three each, care being taken that the age, period of lactation, and quantities of milk per day, were as equal as possible. The cows were turned out to grass on April 5th. The concentrated rations had been the same for both lots prior to the commencement of the experiment from the beginning of the year.

The rations fed during the experiment were as follows, *viz.*:—

Lot 1. (Soy Bean Cake).

Daily concentrated ration :

Soy Bean Cake	...	...	...	4 lbs.
Bran	...	...	...	1 lb.
Ground Oats	...	...	...	2 lbs.
				<hr/> 7 lbs.

Lot 2. (Decorticated Cotton Cake).

Daily concentrated ration :

Decorticated Cotton Cake	...	...	...	4 lbs.
Bran	...	...	...	1 lb.
Ground Oats	...	...	...	2 lbs.
				<hr/> 7 lbs.

In addition to the above each lot received—

35 lbs. pulped mangels;

6—8 lbs. chaff;

and a small allowance of hay in the field at night.

The milk of each lot was carefully weighed night and morning, and tested for the percentage of butter fat and cream, the weekly averages being as follows, *viz.*:—

Lot 1. Fed on Soy Bean Cake.

Week ending.	A.M.	% of Fat.	% of Cream	P.M.	% of Fat.	% of Cream
	Milk in lbs.			Milk in lbs.		
April 18th ...	465	3.05	9.71	273	3.91	11.0
„ 25th ...	449½	3.01	8.35	263½	4.08	9.71
May 2nd ...	459½	3.28	9.07	244	3.80	10.43
„ 9th ...	462½	3.17	8.14	254	4.00	9.14

Lot 2. Fed on Decorticated Cotton Cake.

Week ending	A.M.	% of Fat.	% of Cream	P.M.	% of Fat.	% of Cream
	Milk in lbs.			Milk in lbs.		
April 18th ...	386	3.04	11.64	237	3.82	14.14
„ 25th ...	395	2.92	10.85	241½	4.03	14.28
May 2nd ...	388	2.87	10.71	239½	3.95	14.80
„ 9th ...	381½	2.80	9.14	250	3.91	13.27

Separation of Cream.

Each lot of milk was separated at the same temperature (100 deg. F.), the cream being afterwards scalded at 150 deg. F., and then cooled to 60 deg. A starter was then added at the rate of a half-pint per gallon of cream.

It was decided to churn three times a week for the purpose of observing the effect of each food on the butter produced.

It is to be noted that the times of milking were 6 a.m. and 3 p.m. respectively, and the long interval would account for the low percentage of butter fat in the morning's milk.

Another fact worthy of attention is the higher percentage of fat in the morning's milk of Lot 1 (fed on bean cake) as compared with that of Lot 2. The percentage of cream, however, in Lot 2 will be seen to be higher than Lot 1, thus showing the unreliability of the creamometer as a test for quality. This was further shown when churning the cream from the two lots. Details of the temperature and time of churning, together with the butter produced, are set out in the following table:—

Lot 1. Fed on Soy Bean Cake.

Week ending.	Temp. of Churn.	Temp. of Cream.	Time in Churning.	Lbs. Butter made	Ratio of Butter to Milk.
				lbs. ozs.	
April 18th ...	61° F.	59° F.	16 min.	27 10	1 : 26.71
" 25th ...	59°	58°	10½ "	27 11	1 : 25.75
May 2nd ...	58°	57°	12 "	26 12	1 : 26.31
" 9th ...	59°	56°	20 "	27 4	1 : 20.20

Lot 2. Fed on Decorticated Cotton Cake.

Week ending.	Temp. of Churn.	Temp. of Cream.	Time in Churning	Lbs. Butter made.	Ratio of Butter to Milk
				lbs ozs.	
April 18th ...	62° F.	61° F.	41 min.	24 11	1 : 25.23
" 25th ...	64°	62°	20 "	24 1	1 : 26.43
May 2nd ...	64°	62°	23 "	22 9	1 : 27.79
" 9th ...	62°	60°	37 "	22 8	1 : 28.04

At the commencement of the experiment both lots of cream were churned at exactly the same temperature, but this had to be altered to suit the condition of the butter from each lot. In Lot 1 the temperature had to be lowered, on account of the butter being of too soft and oily a nature; whereas in Lot 2 the temperature had to be raised, as the butter was very hard and brittle and difficult to collect.

It will be seen from the above that there was a considerable difference in the time occupied in churning each lot, the cream from the soy bean

cake churning in a much shorter time than that from the decorticated cotton cake. The butter from the former cake, however, was decidedly soft, as compared with that from the latter cake, which was quite firm and much easier to handle.

With regard to the ratio of butter to milk, taking the last three weeks, when the cows had settled to their new ration, it will be noticed that in Lot 1 the ratio is fairly constant, averaging 1 lb. of butter to 26.12 lbs. of milk, whereas in Lot 2 the ratio varies, gradually widening up to 28.04 lbs. of milk, the average throughout the period being 1 to 27.42.

Conclusions.—The results of this trial may be summarised as follows:—

(1) The yield of milk in each case seems to be little affected by the kind of cake used.

(2) The percentage of butter fat in the case of the bean cake remained almost constant, a slight increase, if anything, being noticed; with the decorticated cotton cake, however, the percentage of butter fat had a tendency to fall.

(3) The butter produced by the bean cake was of a soft, oily nature, and quickly churned, but it yielded well, as shown in the butter ratio (1 lb. of butter to 26.12 lbs. of milk). The butter produced by the decorticated cotton cake, on the other hand, was hard and took a longer time to churn; the yield, however, was not so good as from the bean cake (1 lb. of butter to 27.42 lbs. of milk). From this it seems that the soy bean cake would be the better food for winter feeding.

(4) The butter from the bean cake was of a decidedly paler colour and somewhat inferior flavour as compared with that from the cotton cake.

(5) No difference as to the laxative effect or otherwise of the two cakes was noticeable on the cows.

The following are the guaranteed analyses and prices of the two cakes used in the above experiment:—

<i>Soy Bean Cake.</i>				<i>Dec. Cotton Cake.</i>			
Oil	...	...	60%	Oil	...	...	80%
Albuminoids	...	...	40%	Albuminoids	...	...	34%
at £6 10s. per ton.				at £7 10s. per ton.			

OTHER EXPERIMENTS WITH MILCH COWS.

The following is a record of further experiments on the value of the soy bean for dairy cows compiled by Mr. Liardet*:

Three groups of cows of two lots each were fed to compare (1) soy bean straw and corn stover; (2) soy bean hay and alfalfa hay, and (3)

* *Soya Beans*, p. 19.

soya bean meal and cotton-seed meal. There was no chance in these experiments for the individuality of the animals to affect the results, as each lot was fed on the separate rations at different periods in the course of the experiments.

Soy bean straw was found very palatable and superior to corn stover as a feed. More feed was eaten in the case of the soy bean straw, but the cost of the feeds consumed during the thirty-day period was practically the same. The soy bean ration produced 12 per cent. more milk and 14 per cent. more butter fat so that the cost of a gallon of milk was 1·2 cents less and of a pound of butter fat 2·1 cents less than when corn stover was fed as roughage.

In the comparison of soy bean hay and alfalfa hay, these substances were fed in combination with corn silage and corn and cob meal. Each lot of cows consisted of four Jerseys, and the test lasted through three periods of thirty days each. At the end of this time the results were in favour of the soy bean hay by 245 lbs. of milk and 20·5 lbs. of butter fat. This result indicates a superiority of soy bean hay over alfalfa hay.

SOY BEANS FOR SHEEP.

I have no data of experiments with feeding soy beans to sheep, but what Mr. Liardet* says on the subject may advantageously be reproduced:—

“Experiments have been made to test the value of soya bean seed for fattening lambs. In one experiment two lots of ten lambs each were fed the same roughage. One lot received shelled corn and whole soy beans in equal proportions, while the other received the same quantities of shelled corn and whole oats. The average gain of each lamb during a period of twelve weeks was 16·3 pounds when soy beans constituted a part of the ration and but 13·7 pounds when oats were used. A pound of gain was produced on 6·11 pounds of grain and 7·11 pounds of roughage in the soy bean ration, while 7·28 pounds of grain and 8·62 pounds of roughage were required on the oats ration.

“In another experiment the same rations were fed for twelve weeks to two lots of nine lambs each. The lot receiving the soy bean ration gained 119 lbs. in weight and produced 95·1 lbs. of wool, against 71 lbs. increase in weight, and a production of 81·3 lbs. of wool for the lot receiving the oat ration. The second lot also consumed more feed per lb. of grain.”

The gardener must carry on a constant warfare with insects. He wins out by not letting them get a day's start on him.

* *Op. Cit.* p. 18.

Woburn Experimental Farm.

By LOUDON M. DOUGLAS, Edinburgh.

ONE of the most important of the undertakings carried on by the Royal Agricultural Society of England is the Experimental Farm at Woburn, Bedfordshire. It is situated on the Duke of Bedford's estate, and owes its present character to the fact that the ninth Duke of Bedford offered its use to the Society in 1876, and ever since then it has been applied to the investigation of agricultural problems.

The farm consists of 140 acres, 100 of which are devoted to arable land and the remainder to grass. There is thus ample scope for carrying on experiments in sufficiently large proportions to make the results valuable to the farmer. The soil is of a light sandy loam, the soil being about nine inches deep, and the sub-soil consists of sand. There is, therefore, a difference from that at Rothamsted, where the top soil is of a heavy loam and contains many flint stones, the subsoil being of stiff clay resting on chalk. As the conditions are different in these two experimental places, it is clear that the results obtained would hardly be comparable, but the one may form quite well a complement of the other. This was the view of the Royal Agricultural Society of England in starting Woburn Experimental Farm in 1877, and during the period which has elapsed since then the different results obtained have been much accentuated, so that it would appear that if would desire to intelligently generalise on experimental results in different parts of the United Kingdom and collate the results ascertained in each. The Woburn farm is not conducted primarily with a view to ascertaining what is the most profitable form of agriculture applied to any branch of it, but rather the intention of finding out in a methodical, scientific way what the specific values of various types of plant-food may be. The ordinary farmer, therefore, must be guided by the conclusions of the experienced observers on the spot, whose deductions from the tables of results can thus be applied to actual practice. The staff, it may be said, is a very competent one. The director is Dr. J. Augustus Voelcker, who contributes annually to a resume of the results obtained to the Society's *Journal*; and he is assisted by Mr. W. H. Hogg, farm superintendent, Mr. H. M. Freear, chemist, and others. Every year the secretary of the Society, Mr. Thomas McRow, organises a visit of the members to the Farm, and many take advantage of this opportunity to see the actual work as it is carried on. This year the annual visit took place on July 15th, and some seventy visitors from various parts of the country were present.

THE WORK OF THE FARM.

One of the features of the Farm is the pot culture station, which was instituted in 1907, in consequence of a bequest by Mr. E. H. Hills. This department consists of a completely equipped laboratory, a conservatory, and a wired-in space, and is devoted to the examination and analysis of soils and agricultural products connected with the Farm. Here also experimental work is carried on in conjunction with the field experiments. Such subjects as the relation of the rarer constituents of soil and their action on plant life, the extermination of weeds and fungoid pests, have been investigated, and from time to time investigations have formed the subject of detailed report. As already indicated, the soil of Woburn is deficient in lime, a fact which has modified most of the experiments.

The original idea of the experiments was to ascertain if the results obtained by Gilbert & Lawes at Rothamsted on the heavy soil there would be borne out by similar experiments on the light soil of Woburn, and they have been carried on at this latter place continuously for thirty-four years, the manurial constituents used being the same from year to year. Some of the results obtained are remarkable.

WHEAT GROWING.

In the wheat experiments the crops derived from unmanured land averaged during the first twenty years (1877-96) 11.7 bushels per acre; during the next ten years (1897-1906) the average fell to 8.6 bushels per acre, and during 1909 a further drop took place to 7.5 bushels. The application of mineral alone has had a very poor effect, whereas when these are applied in conjunction with nitrogen as nitrate of soda, the crops have been nearly doubled. With mineral manures and half the quantity of nitrogen derived from sulphate of ammonia, the yield was more than doubled. The omission of nitrogen in any form showed a rapid diminution in one year. The continuous use of ammonium salts for twenty years in succession seemed to give similar results to those obtained from nitrate of soda. After that time, however, the soil rapidly deteriorated and seems to have become quite acid, the crops rapidly dwindled away, the yield being at once restored by application of lime. The attenuated condition of the soil exhibits itself at Woburn in the production of the weed, spurry (*Spergula arvensis*), which, however, disappears at once on the application of lime, and for at least twelve years the effects of the lime remained, as demonstrated in the absence of the weed. The lime seems to become exhausted after twelve years, and this limit may be set to its value as a manure. It may be mentioned that the quantity of lime used was two tons per acre, applied in a finely ground state.

NITROGEN.

The study of nitrogen in its various applications has necessarily been continuous at Woburn, and it has been demonstrated that sulphate of ammonia is of a more permanent character there than nitrate of soda. The latter, indeed, seems to give direct results only for one year, whereas the sulphate of ammonia gives appreciable results for two years in succession. Other sources of nitrogen, such as rape dust and farmyard manure, have a more lasting effect than either, because of their mechanical effect on the soil.

BARLEY GROWING.

In barley growing much the same results have been obtained as with wheat, and, generally speaking, the necessity for lime on the soil has been very clearly demonstrated. The impoverishing of the soil has, as with the wheat crop, given rise to the production of weeds, amongst which coltsfoot (*Tussilago farfara*) predominates, and, as in the case of wheat it disappears on the addition of lime to the mineral and nitrogen ingredients.

UNEXHAUSTED MANURES.

In determining the value of unexhausted manures, recourse is generally had to the tables constructed by Gilbert & Lawes, and as their accuracy has been frequently called in question it was desirable to institute experiments in rotation, which would either confirm or alter them. The plan adopted was to feed two foods, namely, decorticated cotton cake and maize meal, to animals on the Farm, and utilise the manure for specific measured purposes. In these experiments regard had to be had to the exact composition of the cake and meal, the analysis of the manure obtained, and the produce resulting therefrom. The ascertaining of these three factors has been a long and interesting work, and the general result may be stated to be that there is very little difference between the values of maize meal and cotton cake for the unexhausted manure point of view.

PLANTS AS FERTILISERS.

The part played by leguminous plants in fertilising the soil has given rise to many new researches at Woburn, and the results have been of great interest. It may be remembered that Hellriegel first pointed out that clover and similar plants had the power of storing up nitrogen on nodules on their roots. The use of these natural stores of plant food was soon demonstrated, and the explanation of wheat not requiring any nitrogenous manure when sown after clover became apparent. The clover derives its nitrogen from the atmosphere and stores it up on its roots, and thus passes it on to another plant, in which the necessity for nitrogen is strong, but for which no provision has been made by nature for drawing it from atmospheric sources. A curious variation of this natural

sequence has been tried. Tares, rape and mustard were sown and ploughed in twice, and barley planted in the soil, with the result that the best crop was derived from mustard, the second from rape, and the third from tares, which is the only leguminous plant of the three mentioned. This is rather a disturbing result, as it would seem to show that the nodule theory is not quite perfect.

THE GROWING OF LUCERNE.

There are many other subjects being investigated at Woburn besides those mentioned, such as the residual values of top dressings of various kinds, the laying down of grass lands, the improvement of old pastures, the use of magnesia in potato growing, the spraying of potatoes, and others. One of the most interesting of small experiments concerns the growing of lucerne or alfalfa, which has been asserted would not grow in sandy soil. This statement has been shown to be quite inaccurate, as continuous crops of high yield, particularly of the Canadian variety, have been constantly obtained, and it has been shown also that the essential manurial element required is potash.

On the whole a visit to Woburn may be regarded as being of a highly instructive and interesting character, well calculated to make the farmer reflect that the traditional methods of cultivating the soil have been quite revolutionised during the last half century, and other developments will likely occur in the future when we understand a little more of the unseen complex processes, which are constantly being carried on by nature in transforming one form of matter into another.

The low, choppy sow is seldom a good breeder. She does not produce a good-sized litter, but neither are they thrifty pigs. The sow should be long and deep-bodied.

DUCKLINGS WITH SUNSTROKE.—When the ducklings are running out in the sun day, without sufficient shade, they will sometimes be seen to spread out on the ground and become apparently lifeless, in many cases evering stiffening as if dead. This is sunstroke, or something very much like it, and is the direct effect of the sun on the ducklings. It indicates the necessity of furnishing shade during the summer weather by allowing the ducklings to run in the orchard, or elsewhere, where natural shade is available under which they can go. If any are found in the condition described, they should at once be removed to a cool, shady place, their heads moistened with cool water, and a few drops of water put into their bills, being careful that it does not get in their windpipes and choke them.—*Farmers' Gazette*.

Dipping and Tick-Destroying Agents.

SECOND REPORT BY LT.-COL. WATKINS-PITCHFORD.

THE following second report on Dipping and Tick-Destroying Agents has been submitted to the Minister of Agriculture by Lt.-Col. H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E., Government Bacteriologist, Natal. The first report appeared in the *Natal Agricultural Journal* for April, 1909 (page 436):—

In a previous report on the above subject, published last year, I sought to show the efficacy of the various dips or tick-destroying preparations then in general use. The chief object of the inquiry was to ascertain whether such dips were capable of application at short intervals in such a manner that, while all ticks were effectively destroyed, the beast itself would not suffer in the cleansing process. The need of a dip capable of application every few days was shown to be urgent, inasmuch as the usual dipping interval of ten days or longer permitted the possibility between such dippings of the access and escape of one of the forms of tick-life responsible for the spread and perpetuation of the disease East Coast Fever. The endeavour, therefore, was to ensure that any tick gaining access to a beast—however brief its stay on its host might be—could not escape the certainty of becoming poisoned by the dipping to which its host would every few days be subjected.

Examination of most of the dipping fluids, however, revealed the fact that the manufacturers of the same had so adjusted the arsenical strength of their preparations as to make them capable only of application at intervals of some ten days or a fortnight, and dippings at shorter intervals than these were found impossible by reason of the dangerous effects produced upon the beast. A few dips were, indeed, capable of application at short intervals, but such were at the same time found to be deficient in tick-destroying properties and consequently of little or no use for the intended purpose. An effort, therefore, was made to arrange a dipping fluid which, while permitting application every few days, would at the same time prove efficient as a destroyer of tick-life. The outcome of the inquiry was, as set forth in Part I. of this report, the arrangement of a dipping fluid—"The Laboratory Dip"—which has since been used very extensively throughout the Province of Natal and has given excellent results as a short-interval dip.

The following observations, therefore, which constitute Part II. of the report, deal less with the composition and practical use of a successful dip than with the manner in which the effects of such a dip are exerted both upon the animal economy and upon the tick itself.

A system of treatment which entailed the total immersion of cattle at intervals of a few days in a poisonous fluid, such as a solution of arsenic, was recognised from the first as a system which would need the most careful watching in its application. The effect of the regular submersion of cattle, even in water, at short intervals seemed a sufficiently marked departure from the natural habits of the domesticated ox to necessitate close observation in its effects upon the health of the animal, but where a highly poisonous fluid (such as an arsenical solution) was employed the need for extended and careful observation was naturally greatly increased before the adoption of such a system could be recommended. Wide practical results, however, have fully justified the hopes which were entertained regarding the usefulness of such a system of short-interval dipping, and the succeeding observations are designed to prove that the advantages of the adoption of such a system are not merely the advantages to be expected from a more frequent immersion of the beast and the more frequent "mechanical"—if I may use the term—killing of the ticks upon its body by such immersion. Such increased killing effect would in itself justify the system in districts where, as in East Coast Fever, the rapid destruction and restraint of tick-life was of paramount importance. This advantage, however, is of even less importance than the striking secondary results which are found to attend the adoption of short-interval dipping, which results, so far as the question of tick destruction is concerned, would appear in the aggregate even to exceed the destructive effect of actual immersion upon those ticks which are carried by the beast through the dipping tank itself.

These secondary results, which follow only frequent dipping or spraying at short interval, appear to be of the nature of an habituation or tolerance of the tissues of the animal to the presence of arsenic. The effects from these frequent dippings appear to accumulate within the animal's system, producing as they accumulate a corresponding degree of tolerance or habituation on the part of the animal, the deeper layers of whose skin gradually become temporarily charged so to speak with arsenic so as to render the beast poisonous to any ticks which may become attached in the intervals between the dippings. This cumulative effect is, as will be seen, a far reaching one, for an ox in such a condition will be the means of collecting and destroying a large number of ticks apart from those which he actually takes into the dip and destroys by immersion in the dipping fluid.

The excretion or throwing off from the system of the accumulated arsenic is, however, a rapid process, as will be seen from schedules given below, and it is only by the short-interval dipping or spraying that this

loss can be compensated, if the animal is to be maintained in its maximum tick-killing condition. A comparatively long interval of, say, ten days or a fortnight between dippings appears from the evidence collected to be too long to permit of the establishment and maintenance of this condition of maximum accumulation, and an animal dipped at such intervals would appear to be able only to act as the vehicle by which ticks are collected and conveyed to the dipping tank, there to be killed by submersion in an arsenical fluid.

That a beast can be safely habituated to the system of short-interval dipping with an arsenical fluid of known composition and strength is abundantly proved by the Natal results of the past two years, many thousands of animals having been regularly subjected to the process in this Province every five days without danger to their use for food purposes or detriment of their health and condition, and with the best results as regards the suppression of tick-life in general. Some stock-owners have reported the fact that the growth of the animal's hair seems to be stimulated to a considerable degree by frequent dippings (a cause for which effect is suggested in Schedule F), but no reports of any attendant evil effects—apart from avoidable accidents—have been received, the weight of evidence being consistently favourable and encouraging to the wider application of this system of dipping. It may be taken then as satisfactory proof that an animal can be accustomed to frequent immersion or dippings in an arsenical fluid without damage to health or check to growth. Habituation to arsenic, taken internally, has long been recognised as a possibility. In lower Austria it will be remembered that arsenic is eaten with impunity by the mountaineers and their families, being used as a condiment or combined with sugar as a sweet-meat. The giving of arsenic to cattle and horses to improve their appearance has long been practised, while in certain parts of India native horsemen carry lumps of white arsenic from which their horses are induced to bite or nibble small pieces during a journey in order to improve their powers of endurance and speed. In all such cases, however, gradual habituation is necessary, otherwise poisonous effects are produced. This same necessity for gradual habituation holds to some extent in the use of the short-interval system of dipping. It has been a matter of frequent observation that herds not accustomed to any dipping will become scalded and otherwise affected by their first immersion, and similarly that cattle accustomed to be dipped only once a fortnight will be temporarily affected by a too abrupt adoption of the short-interval dipping of five days. (This point of the establishment of tolerance was noticed in Part I. of this report, page 9.) Habituation, however, in any case becomes rapidly established, and a few weeks only are necessary to ac-

custom an animal to submersion in the "Laboratory Dip" every five days without any discomfort. It appears, however, to be some time after this point has been attained to before the maximum degree of tick-killing capacity is reached, when the animal appears to be incapable of further accommodation, having reached a point so to speak of saturation. This point of saturation appears to be a remarkably constant one (as reference to Schedule E, items 1 to 4. will show), and, as far as analysis of the animal's skin shows, no efforts to increase the amount of arsenic by constantly repeated applications of the dip produce any further augmentation of the arsenical content. In fact, as will be seen from the succeeding observations, the deeper layers of the skin appear to be capable of becoming so tolerant of the presence of arsenic that the latter becomes tolerated to a considerable extent. That this accumulation is not a mere mechanical deposition or passive soaking, but is rather a vital and active process, is indicated in Schedule E, items 5 and 5a. Here will be noticed that the endeavour to increase the arsenical content in the fresh skin of a dead beast is not attended by success. In fact it will be seen from the schedule that the actual amount of arsenic in the skin is less (perhaps through its contraction after death), although extra *post-mortem* spraying has increased the arsenic content of the hair covering the skin. This indication of the vital action of the skin is further borne out by the fact that any arsenic in excess of the maximum content is eliminated from the skin, the elimination taking place through absorption by the blood-vessels which are contained in its deeper layers, such excess of arsenic appearing shortly afterwards in the urine (Schedule F). When we further consider it is into this deep layer of the skin that the ticks thrusts its mouth parts and obtains its nourishment, we shall partly see the significance of being able to establish and maintain a supply of arsenic at such a point of attack. This ability of the skin to absorb and tolerate the presence of considerable quantities of arsenic is a point of interest also, in view of the generally accepted theory that the normal skin of an animal is not capable of absorbing arsenical solutions. It would appear, however, as said above, that not only is such active absorption possible, but, further, that the living skin is capable of so adapting itself as to tolerate, and even store, considerable traces of arsenic without departure from its normal functions or condition.

Such a fact would appear to be of useful application in the South African problem of the eradication of the tick, with all its attendant evils.

Inspection of Schedule E shows that the hair and epidermis, or

scurf, of a beast's skin retains also a remarkable quantity of arsenic after dipping or spraying, far more, indeed, than the living skin beneath. One of the interesting points shown below is the behaviour of an animal's hair towards arsenical solutions and the length of time during which arsenic will persist in an animal's coat after dipping. In the Royal Commission on Arsenical Poisoning, which reported in 1908, it is stated that arsenic could be detected in the hair of persons "several weeks after the drug had ceased to be taken," and, further, that it appeared probable that arsenic had a special affinity for epidermic tissues. Such a finding receives strong corroboration from the present work. One instance showing the marked persistence of arsenic in the hair is shown in the case of beasts Nos. 8 and 9 in Schedule E. In this case a small dairy herd was, through carelessness, sprayed on 31st December, 1909, with a solution of arsenic much in excess of the proper strength. Several of the animals died in consequence, and the remainder exhibited symptoms of severe arsenical poisoning. This result so disconcerted the owner that all attempts at future spraying or dipping were abandoned. At the end of June, 1910, several of the surviving animals were purchased for experimental purposes, and it was found that their coats still contained considerable traces of arsenic. In another instance, as showing the persistence of arsenic in the hair, it was found that exposure to an extremely heavy rain (three inches) did not result in the appreciable lessening of the arsenic contained in the coat of the beast so exposed.

While such points are of interest as showing the persistence of arsenic in the external covering or hair of dipped beasts, no very practical deductions can be made from the same, inasmuch as it is by the skin layers below the hair that the poisonous effects are communicated to the tick, and it is probable that the mere presence of arsenic in the hair itself has but small effect upon the tick. An animal dipped every fortnight might thus hold the same amount of arsenic in his coat as one submitted to short-interval dipping,* but the same quantities existing in the skin itself would differ widely, while the actual tick-killing potentialities of the two animals could hardly be compared. It is now possible to understand the reason for the frequent instances which have been brought to notice in which owners of herds have expressed their disappointment at the non-effectiveness of their first dippings in cleaning their cattle from ticks, but have subsequently reported their entire satisfaction with results obtained. This early ineffectual period we now recognise as corresponding to the stage of incomplete habituation, during which ticks gaining access

* Compare the arsenic in coats of No. 5 after eight weeks, and in beast No. 2 sprayed for ten consecutive days. (Schedule "E.")

to a beast after dipping have remained in evidence until actual immersion in the dip ultimately poisons them. In addition to this, it will be seen on reference to Schedule C that the lethal effect of actual immersion on ticks is more pronounced where they happen to be attached to habituated rather than to unhabituated animals at the time of or just before dipping. This result suggests the probability of the tick becoming poisoned both by ingestion of arsenic (by sucking it from the skin) and also by the absorption of the poison deposited upon the external surfaces of its body during the process of dipping or spraying. This latter means, by which the destruction of the ticks is brought about, takes effect only in the actual process of dipping, while, in the former case, its action is continuous and sustained, and is probably exerted almost as powerfully before dipping as it is afterwards. We thus see that the value of frequent dipping lies in the sustained effect produced rather than in the mechanical destruction of ticks which follows immersion in the dip tank, and, as will be shown below, this maximum killing efficiency of a beast is only to be maintained by the repetition of the dip or spray process with such frequency as will compensate the skin for the loss of arsenic which is continuously absorbed from it by the blood and excreted in the urine by a natural process of elimination. Examination of Schedule B will show that the power of an habituated animal to destroy ticks placed upon it (or gaining access in the natural manner after dipping) is rapidly lost, five or six days lapse sufficing to reduce such an animal to nearly the same condition as that which exists in the case of the unhabituated animal or beast which is dipped at the long interval of, say, ten days or a fortnight.

The fact that the blood absorbs any excess of arsenic from the skin might lead to the inference that it is the circulating blood which proves poisonous to ticks becoming attached to an animal. That this is not so may readily be shown by taking an unhabituated beast and attaching a number of ticks over a given limited area (as under the tail). If the animal is now thoroughly sprayed all over its body, and care taken to except this small area, and guard against its being moistened by the arsenical solution, it will be found that the attached ticks will remain unaffected, showing thereby that the destruction of the tick is effected by strictly local influences, either by the deposit upon its body directly of the poisonous fluid itself or by the process of imbibition, or sucking, of the same from the deeper layers of the skin of an habituated animal.

Conversely, it can be shown that the poisonous effect, though strictly local, is not due to a simple deposition on the surface of the skin, resulting from one or more dippings. If, in an habituated animal, a patch of

skin is shaved closely and then thoroughly washed so as to remove all deposited arsenic with the hair and surface epithelium before attaching the ticks, the lethal result will follow to the same degree as in the case of an habituated animal in which such precautions have not been taken. The practical bearing of observations, therefore, is that all parts of an animal to which ticks can gain access must be subjected to the *thorough application of the arsenical solution at short intervals*. If this point is not observed, regions of the body will remain open to attack, and may prove the "heel of Achilles"—the one small vulnerable point of attack--through which infection may become established.

If care is taken to notice the number of animals passing through a dip which manage to escape a complete contact with the dipping fluid, the percentage will be found considerable. Many beasts will fail to completely immerse their heads, the root of the ears and poll frequently escaping, while others will be found to keep the tail so close that a dry area will be formed under its root after the beast emerges from the dip, or the ears will be held closely applied to the head, thereby avoiding the thorough irrigation of their interior surfaces. Completely effectual immersions will not, as a rule, be found in much more than 80 per cent. of cattle dipped, especially where beasts are hastily hustled through a dip-tank. These points should be remembered in routine dipping, otherwise areas of skin, such as the root of the tail or the inner ear (which are actual "predilection sites" for the tick) will permit escape of the ticks there attached, and prevent the establishment of any habituation of the tissues at such spots. The smearing or hand dressing of these parts by oily preparations is a useful procedure, so far as it acts as a deterrent to tick approach, but if the protection of the animal is to be made as complete as possible such measures should not be made to supersede the application of the dipping fluid itself to the parts in question if this thorough application of an arsenical solution to all parts is ensured, either by spraying or effectual dipping (or a combination of both processes easy of application), it will be found that the need for special oily dressings, etc., will be, in a great measure, done away with. Where such measures as the above are adopted upon a fenced farm the eradication, or reduction to a minimum, of tick-life is accomplished within a surprisingly short space of time, but where, instead of the system of short-interval dipping, an interval of two weeks has been allowed to elapse, the progress towards eradication has been much slower, such an interval, especially during hot weather, permitting the increase of innumerable ticks which, under the system of short-interval dipping, would either have been poisoned upon the beast or have met their destruction through the more frequent immersion necessitated by that system.

The following schedules may, perhaps, be open to the objection that they have been based upon meagre data. This may be so, but it is thought such data will be found ample enough to establish the point at issue in a sufficiently conclusive manner. Although the foregoing observations have been based upon the action and effect of an arsenical fluid of known composition*—the "Laboratory Dip"—it is probable that several of the proprietary dips, recently adjusted and now before the public, would have given equally satisfactory results.

The endeavour of the writer, however, has been simply to show that arsenic (in certain definite proportions and combinations) is capable of more effective use as a destroyer of tick-life than has been generally accepted in the past. Its further influence in retarding the development of pathogenic germs after their inoculation is a point also likely to prove of utility in the suppression of tick-borne diseases. Apart, however, from the control of tick diseases, the economic loss to South Africa from tick ravage is considerable, and it is hoped that the widening of our knowledge, however slightly, will tend to advance the time when the eradication of the tick from South Africa will be considered as a not impracticable policy.

I wish to acknowledge the able help received in the foregoing work from my veterinary assistant, Mr. Shilston, M.R.C.V.S., who has been assiduous in his efforts to further the same.

SCHEDULE "A."

THE ABILITY OF AN ANIMAL TO KILL TICKS PLACED UPON IT INCREASES WITH THE NUMBER OF DIPPINGS SUCH ANIMAL RECEIVES.

1. *One Spraying (or Dipping)*—

No. of animals: 2.

No. of ticks applied to each: 6.

No. 1. All ticks alive and attached after twenty-four hours; two dead next day, and one the day following.

No. 2. Five ticks alive and remaining attached after three days (engorged).

* The maintenance of such dipping fluids at their proper strength is a point of some importance, neglect of which has been the cause of both failure and loss in several known cases. This difficulty of maintaining the proper arsenical strength can be, in a great measure, overcome by the use of a simple appliance devised by my brother, Dr. Watkins-Pitchford, by which the farmer can, at any time, ascertain the exact strength of his dip, even though he has no specialized knowledge. —H.W.P.

2. Two Sprayings—

No. of animals: 2.

No. of ticks applied to each: 6.

Interval between sprayings: 24 hours.

No. 9. One tick dead in 24 hours, the remainder being removed in course of experiment (see below).

No. 10. Three ticks dead in 24 hours, the remainder being removed.

3. Three Sprayings—

No. of animals: 6.

No. of ticks applied: 1 infected tick to each.

Interval between sprayings: 3 days.

No. 19. Removed alive after 15 minutes.

No. 20. Removed alive after 2 hours.

No. 21. Dropped after feeding for 2 hours.

No. 22. Dropped after feeding for $3\frac{1}{2}$ hours.

No. 23. Dropped after feeding for $1\frac{1}{2}$ hours.

No. 24. Moribund after 3 hours: removed dead in 24 hours.

4. Four Sprayings—

No. of animals: 6.

No. of ticks applied: 1 infected tick to each.

Interval between sprayings: 3 days.

No. 13. Tick removed alive after 1 hour.

No. 14. Tick dead within 24 hours.

No. 15. Tick dead within 24 hours.

No. 16. Tick removed alive after 30 minutes.

No. 17. Tick removed dead after 6 hours.

No. 18. Tick removed dead after $6\frac{1}{2}$ hours.

N.B.—In the case of two, three, and four sprayings, the ticks were only induced to attach themselves with difficulty.

Observations upon Schedule "A."—

It will be noticed that the ticks, in the case of one spraying, survive the animals Nos. 1 and 2 being unable to exert any poisonous effects upon the ticks subsequently placed on them.

In the case of two sprayings, animals Nos. 9 and 10 permit the survival for a period of twenty hours of the majority of their ticks.

In the case of three and four sprayings, only one tick (infected) was attached to each animal, the endeavour being to ensure the infection of the animals in question by the smallest number of ticks.

The results upon the individual ticks would appear to indicate in a satisfactory manner the increasing killing capacity of the skin of the beast. In the case of four sprayings, the lethal effect upon the tick is well marked, a few hours in some cases sufficing to ensure its destruction.

In the above cases the skin at the point of the attachment of the ticks was thoroughly cleansed to ensure the absence of arsenic which might have become deposited upon the surface from the spray.

N.B.—Throughout the succeeding observations the process of spraying or dipping has been adopted indifferently, the strength of the spraying and dipping fluids being equal in all cases.

SCHEDULE "B."

THE LENGTH OF TIME ELAPSING SINCE THE LAST DIPPING DETERMINES THE ABILITY OF AN HABITUATED ANIMAL TO KILL TICKS WHICH MAY BECOME ATTACHED TO IT.

No. of Beast	Days since Dipping													
	1 day		2 days		3 days		5 days		7 days		10 days		Non-dipped Controls	
	No. 8	No. 20	No. 1	No. 21	No. 11	No. 19	No. 22	No. 25	No. 16	No. 24	No. 26	No. 23	No. 6	No. 9
No. of Hours since attachment of Ticks	No. of Ticks attached		No. of Ticks attached		No. of Ticks attached		No. of Ticks attached		No. of Ticks attached		No. of Ticks attached		No. of Ticks attached	
	6	6	10	9	10	12	17	11	10	11	13	13	4	4
12	4	6	10	8	9	12	12	10	10	10	11	10	4	4
24	1	2	4	5	5	3	5	10	8	6	9	6	4	4
36	0	0	1	4	5	3	4	9	6	6	8	6	4	4
48	0	0	0	2	1	2	3	9	6	6	8	6	4	4
72	0	0	0	1	0	0	0	8	3	6	7	6	4	4

Observations on above:—

The main indications of this experiment are sufficiently clear to show that—even after an extended period—the influence of habituation is exerted to some degree. During the three or four days succeeding dipping the lethal capacity of an animal appears considerable, but this power drops in a week or ten days so that only about 50 per cent. of ticks attaching themselves would be poisoned. The lessened ability of certain animals to deal with ticks gaining access to their skin (c.f. No. 25 above), is noticed in observations on Schedule F. In none of the unhabituated animals—of which several were used as controls—were ticks observed to be other than vigorous, no dead ones being at any time found.

SCHEDULE "C."

OBSERVATIONS TO SHOW THAT IN HABITUATED ANIMALS THE EFFECT ON TICKS OF A GIVEN DIPPING IS MORE RAPID THAN IN NON-HABITUATED ANIMALS.

No. of Beast	Habituated			Non-habituated			
	No. 11	No. 19	No. 39	No. 6	No. 29	No. 31	No. 33
Hours after Dipping	No. of Ticks attached before Dipping			No. of Ticks attached before Dipping			
	15	7	14	16	10	7	13
	No. of Ticks surviving after Dipping			No. of Ticks surviving after Dipping			
3	4	5	10	16	7	7	12
6	4	1 Moribund	3	13	7	7	10
9	3	0	1	5	4	4	8
20	0	0	0	2	0	1	3
24	0	0	0	1	0	0	2

Observations on above:—

It will be seen from the above table that the rapidity with which an habituated animal is able to deal with the majority of its ticks during the first few hours after dipping, is greater than in the case of non-habituated animals; thus at 6 hours the habituated animals show the survival of only 27, 14, and 21 per cent. of their ticks, while the un-habituated retain alive 70, 77, 81, and 100 per cent. of their ticks respectively.

SCHEDULE "D."

OBSERVATIONS TO SHOW THE RETARDATION OF THE INFECTIVE PROCESS IN THE HABITUATED ANIMAL.

Days since Exposure	A						B						C					
	Control animals, not dipped, and exposed to infected veld for periods as shown						Animals dipped, only after exposure to infected veld, for periods as shown						Animals dipped 24 hours before and also after exposure to infected veld for periods shown.					
	4 hour	2 hours	6 hours	9 hours	27		4 hour	2 hours	6 hours	9 hours	26		4 hour	2 hours	6 hours	9 hours	12	
1	100'6	102'6	99	101'4	102'2		100'4	101'2	100'5	102	101		100'2	101'2	99'4	100'6		
2	100'8	102	101	101'8	99'8		102'6	101'2	101	101'2	100'6		100'6	100'4	101'2	101'6		
3	101	101	102	102	99'6		102'6	100'6	100'3	101'6	101		100	101	101'6	102		
4	101'2	101'2	101'7	102'8	101'4		101'6	103	101'7	101'8	101'6		100'4	99	102	102'6		
5	101'4	100'6	102'4	101'8	100		101'6	101'4	101'4	101'4	101'2		101'4	100'4	101'4	102		
6	100'6	101	102	101'4	101'4		101'6	101'2	101'2	101'4	101'8		100'6	99'6	102	102		
7	101'4	103	102'7	101'4	99'7		99'6	100	101'3	101'6	101'4		100'8	97'6	102'6	101'6		
8	101'8	104'8	103	101'8	102'6		100'8	102	102	101'6	101'4		101	102	102	100'6		
9	102	106'2	102'6	101'4	104'6		101'4	101	101	102	101'6		100'4	99'6	102'4	102		
10	105'2	105'6	103'6	101	104'6		101'8	102	101	102'6	102'6		101'2	100'2	101'7	100'6		
11	105'4	105'4	103	105'4	105'4		101'7	103'6	102'8	101'4	104		100'8	101'2	102'2	101'6		
12	105'8	105'4	103'2	105'6	105'7		103	106	102	101	105'8		100	100'6	102	100'4		
13	106'2	106'2	104	105'6	105'7		104	106'8	101'8	101	105'6		100	100'4	102'4	102'6		
14	106'4	106'4	104	106'2	105'7		104'6	105'4	101'7	101'6	105		100	103'2	100'4	101		
15	106'8	106'2	103	105'7	105'7		104	106'8	102	101'6	105'6		99'6	105'4	101'2	101'4		
16	106	106'4	104	105'8	105'4		104'6	105'4	101'6	102	105'6		100'6	105'4	101'2	101'6		
17	105'6	107'2	103'7	106'6	105'4		103'8	106	102'6	101'6	106		100'6	106'3	101'6	101'8		
18	105'6	105'7	105'6	105'2	105		103'8	104'8	103'6	101'6	106'4		99'8	105'6	101	103		
10th day 7th day, 8th day, 11th day, 9th day.							12th day, 11th day, 12th day.						15th day, 18th day.					
Average period of incubation : 9 days.							Average period of incubation : 12½ days.						Average period of incubation : 16 days.					

Observations upon Schedule 'D':—

The above table shows the distinct influence of dipping in lengthening the period of incubation of East Coast Fever.

Where dipping followed directly after the exposure to infection (Table B), the average period of onset is over the twelfth day, while one out of the five animals exposed to the infection has failed to react up to the twenty-fourth day.

Where dipping precedes by twenty-four hours and immediately succeeds such exposure to infection (Table C), the average incubation is extended to sixteen days, while here two beasts have failed to contract the disease.

In Table A all the animals have become infected during the period of their exposure at an average incubation period of nine days. The temperatures shown are in all cases morning temperatures, the midday and evening registrations being more pronounced.

The numbers of animals comprising this experiment are small, but the final comparative results show satisfactorily the undoubted influence exerted by the arsenical applications.

Notes taken as the animals were removed from the infection paddock showed that infection by nymphal brown ticks existed in every case, though never to an excessive degree. Adult brown ticks were only occasionally noted. The effect of dipping or spraying upon these immature ticks is so rapidly exerted that, an hour or two after the application of the fluid, the majority will be found dead, and it is probable the poisoning process begins directly the arsenical solution is brought into contact with the insect. In adult ticks—which are more hardy—the legs commence to straighten out and relax their hold in from two to three hours after dipping, this being especially the case where they are attached to an habituated beast. Such observations go to prove that the actual infection of an animal is rapidly established after the attachment of the infective tick, and the persistence of the tick for any length of time at the point of its attachment is not necessary for the accomplishment of the infective process.

The lengthened period of incubation shown in the above table shows that the restraining influence is one exerted upon the disease germ itself after its deposition by the tick in the deeper layers of the animal's skin rather than to a restraint exerted upon the actual mechanism of infection by the tick.

The importance therefore is obvious of so habituating a beast that the deeper layers of his skin may become able both to poison the tick and also to exert a restraining influence upon the development of the disease-germ itself, though whether this restraint can be exerted to such

an extent as will permanently hold back the development of such germ—is a matter for further observation.

The extension of the incubation time, however, from an average of from nine to at least sixteen days proves that a degree of restraint hitherto unsuspected is possible to the habituated animal apart from his increased power as a tick destroyer.

SCHEDULE "E."

ESTIMATION OF THE AMOUNT OF ARSENIC RETAINED BY THE HAIR AND
HIDE OF ANIMALS FOR VARYING PERIODS AFTER DIPPING.

Number 1.

Devon heifer.

Skin: Very thin, 1 sq. ft. weighing $6\frac{1}{2}$ oz.

Hair: Long, fine, and thick.

Sprayings: Last six sprayings in twenty-four hours; previously every fifth day.

Killed: Twenty-four hours after last spraying.

Analysis: 1 sq. ft. of skin contained:—

In Hair and Scurf.	In Skin itself
302 grammes, or 10 grains.	228 grammes, or 3.518 grains.

Number 2.

Black and white bull.

Skin: Medium thickness.

Hair: Strong, medium length, but not thick.

Sprayings: Daily for ten days; previously every fifth day.

Killed: Twenty-four hours after last spraying.

Analysis: 1 sq. ft. of skin contained:—

In Hair and Scurf.	In Skin itself.
201 grammes, or 3.1 grains	196 grammes, or 3.02 grains.

Number 3.

Devon bull.

Skin: Medium thickness.

Hair: Fine, long, and very thick.

Sprayings: Every five days for months, and last sprayings every third day.

Killed: Twenty-four hours after last spraying.

Analysis: 1 sq. ft. of skin contained:—

In Hair and Scurf	In Skin itself.
527 grammes, or 8.1 grains.	224 grammes, or 3.45 grains.

Number 4.

Black heifer (Kafir).

Skin: Very thick, 1 square foot weighing 18 oz.

Hair: Strong, medium length, fairly thick.

Sprayings: Every five days for several months.

Killed: Five days after last spraying.

Analysis: 1 sq. ft. of skin contained:—

In Hair and Scurf.	In Skin itself.
·352 gramme, or 5·4 grains.	·251 gramme, or 3·87 grains.

Number 5.

Shorthorn heifer.

Skin: Not taken.

Hair: Fairly long, fine, medium thickness, 26·55 grammes to square ft.

Spraying: Once five days before death. Not previously for eight weeks.

Analysis: 1 sq. ft. of hair contained:—

·116 gramme, or 1·8 grains

The carcass of this beast was sprayed immediately after death, and after drying 1 square foot of skin was removed weighing 8 $\frac{3}{4}$ ozs.

In Hair and Scurf.	In Skin itself
·47 gramme, or 7·25 grains.	·008 gramme, or 0·123 grains.

Number 6.

Cross-bred steer.

Skin: Fairly thick.

Hair: Moderately long.

Spraying: Dipped regularly for several months, killed ten days after last dipping.

Analysis: 1 sq. ft. of skin contained:—

In Hair and Scurf.	In Skin itself.
·26 gramme, or 4 grains.	·137 gramme, or 2·1 grains.

Number 7.

Shorthorn steer.

Skin: Not taken.

Hair: Fairly long, fine, medium thickness, weight being 26·55 gms.

Spraying: Last spraying eight weeks before removal of hair.

Analysis: Hair and scurf from 1 square foot contained:—

·156 gramme, or 2·45 grains.

Number 8.

Calf: Was sprayed six months before taking hair (see text); 1 square foot of hair contained:—

0·388 gramme, or ·6 grain.

Number 9.

Calf: Sprayed seven months before taking hair; 1 square foot contained:—

·0194 gramme, or ·3 grain

Observations upon Schedule "E":—

The main points of interest above are the ability of retention of arsenic by the skin itself, and also the extent to which the hair absorbs and retains the same.

In No. 1 above, the endeavour was made to increase the arsenical content of the skin by a repetition of the spraying process every few hours, allowing time only for the previous spraying to dry, the animal having been previously dipped every five days for many months. The approximate amount of arsenic in one square foot of hide removed after death was $3\frac{1}{2}$ grains, or less even than in the case of the animal No. 4, which had been simply dipped every five days but whose skin contained—in a similar area—nearly 4 grains. Daily sprayings for ten days (No. 2) after previous habituation gives even a lower figure (3.02 grains), while after ten days' cessation from his regular five-day spraying, No. 6 still possesses 4 grains of arsenic to the square foot.

Differences of thickness in the skins estimated probably accounted for corresponding differences in arsenical content to some extent, for such differences in weight of one square foot taken from the same region of different beasts varied greatly. Such variance, however, cannot explain the great disparity existing between cases No. 1 and 4, where the much lighter square of skin ($6\frac{1}{2}$ oz.) contained nearly as much arsenic as the piece almost three times its own weight and thickness.

The differences in the rate of elimination as well as the lengths of time since spraying would also determine to no small extent the differences observed in the arsenical contents.

(This question of rate of elimination is dealt with in Schedule "P.")

The main point brought out by the skin figures above is—considering the variations of time, interval, etc.—the constancy of the physiological "saturation point," which varies in the skins of fully habituated animals such as Nos. 1, 2, and 3, only from 3.02 grains to 3.87 grains.

Where an animal such as No. 5 has been allowed to remain free from arsenical applications for an extended period such as eight weeks, the skin content is seen to have fallen to less than half a grain, while ten days since the last dipping allows the arsenical content of the skin to fall to two and one-tenth grains (No. 6), at which point the beast was unable, in forty-eight hours, to kill any of the ticks with which he was experimentally infested.

Examination of the figures given for the hair are interesting as showing the persistence of traces of arsenic (in Nos. 8 and 9) after six and seven months respectively, and also as confirming the extent of the "affinity" of epidermic structures alluded to elsewhere.

SCHEDULE "F."
TO SHOW THE ELIMINATION OF ARSENIC BY THE KIDNEYS AT
VARYING PERIODS AFTER DIPPING.

Number of Beast.	Percentage of Arsenic in Urine at intervals since Spraying, <i>et infra</i> .							
	3 hours	6 hours	10 hours	24 hours	32 hours	48 hours	56 hours	72 hours
20	'015	'021	028	'024	'032	'027	'019	'045
19	'06	'083	'049	'044	'022	'036	'043	'039
31	—	'053	'097	'057	'036	—	'023	'011
12	—	'077	'095	'027	'024	'004	'015	'024

Observations upon Schedule "F":—

The above observations were suggested by (1) the constancy of the point of physiological saturation (as noted in Schedule "E") and speculation as to the probable channel by which arsenic in excess of that amount became eliminated, and (2) from the varying behaviour of certain cattle (in respect of their tick-killing properties) after exposure to equal arsenical treatment.

The presence of arsenic in the urine after dipping proves its active absorption by the living skin, and also tends to disprove the generally accepted theory of the non-absorption of watery solutions by the skin.

In the schedule above it will be noticed that the period of maximum excretion of arsenic is, in the case of Nos. 11 and 12, during the earlier hours succeeding dipping (from the sixth to the tenth hours), and that after this period a rapidly decreasing output is observed. This falling off is not so marked in the case of No. 19, although the figure during the first six hours is very high; No. 20 maintains a steady output, being higher at seventy-two hours (when observations were discontinued) than at any previous time. This beast was chosen for urine examination because he rapidly destroyed any ticks placed upon him. No. 19 possessed the usual killing capacity, while Nos. 31 and 12 were chosen as being unusually deficient in this respect. The results of the examination of the urine of the above animals strongly suggests the existence of a varying individual tick-killing power determined—on the one hand—by the serviceable retention, or—on the other—by the too rapid elimination of the arsenic gaining access to the skin through dipping. Further confirmatory observations on this point would be of interest, though their

practical value would not be great inasmuch as the refractory or non-tick-killing condition is only found in a minority of animals so far as I am able to determine.

NOTES ON TECHNIQUE, ETC.

The methods by which the arsenical estimations were arrived at were those in general use. The quantitative figures given in Schedules "E" and "F" have a strict comparative value amongst themselves, and these were obtained by the usual methods of quantitative analysis.

Qualitative confirmation was, however, in nearly all cases resorted to as check to observations, and controls of normal skin and normal urine were used to correct the methods employed. In most cases of skin analysis presence of arsenic was confirmed by Reinsch's method, the more delicate test of Gutzeit being employed in all other cases. A comparative rather than a quantitative value is, however, claimed for the above observations as being the point of practical value to be aimed at.

In the case of urine estimations no measure of the total quantity excreted during the twenty-four hours was secured.

Skin areas were carefully marked off on the living beast to avoid error through stretching, contraction, etc., after death, when such skin was removed from the carcass. The hair was then clipped close and the area of skin shaved as closely as possible. Weighings were then made of skin and hair.

Ticks used for the purpose of determining the lethal effect of sprayings, dippings, etc., were mainly adult red ticks (*R. evertsi*), though brown (*R. appendiculatus*) nymphal and adult forms were frequently used, and occasionally bont (*A. hebraeum*) and bont-legged ticks (*H. aegyptium*) were secured for the purpose.

The infections produced by exposure to infected paddock were in all cases uncomplicated East Coast Fever, a point which was ascertained both by the finding in the corpuscle of the appropriate organism and by the presence of Koch's bodies in the gland-juice of affected animals.

It has been estimated that a two-year-old steer will eat its own weight of food every two weeks, and if properly bred and of the right type gain an average of from one and a half to two pounds per day.

Sheep as a rule have only two teats though sometimes the rudiments of a second pair are easily distinguished.

New Machinery for Farmers.

NOTES FOR THE COMING SEASON.

A USEFUL RIDING CULTIVATOR.—THE “CHAMPION” PLANTER WITH A NEW IMPROVEMENT.—FACTS ABOUT THE “CERES” SEPARATOR.—THE “SAMSON” PETROL ENGINE.—ANOTHER FIBRE MACHINE.—AN EARTHNUT AND COWPEA THRESHER.

THE development of the use of machinery in connection with farming operations is generally a safe index of the progress of agriculture and of the increasing appreciation of scientific methods on the part of farmers. The use of machinery saves time and labour, and so saves money, and, besides, machinery generally performs work more efficiently than is the case where hand labour is employed, all of which involves an increase in the net profits of the farm. The logical outcome of these reflections is that, where you find a number of agricultural machinery firms well established and doing a good trade, you may take it, first, that the farmers there have been doing fairly well in the past, and, secondly, what is more, that they will do better in the future, other things being equal, whilst, thirdly, you can be pretty confident that those farmers are beginning at least to realise the importance of mechanical power in modern farming as a means both of saving time and labour and of securing improved results.

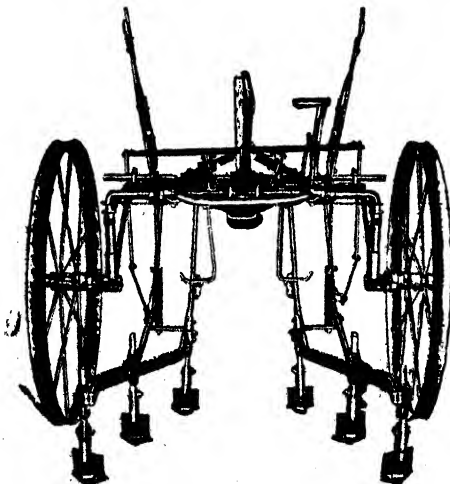
In Natal we have a number of well-established and enterprising machinery firms, who, in a spirit of healthy competition, are doing a great deal in the way of introducing the latest implements and machines from overseas, and, what is more, in securing the adaptation of some of these machines to the special requirements of South Africa. We, for our part, endeavour at every opportunity to bring to the notice of our readers new and improved machines, and whenever occasion offers we prosecute inquiries overseas as to new machines referred to in our exchanges. In the course of the present article we are going to give the results of two such sets of inquiries—one of them dealing with a new fibre machine, and the other with an American peanut or earthnut harvester.

It was in continuance of the endeavours we have made in the past to keep our readers up to date in this direction that, upon receipt recently, from Messrs. Malcomess & Co., Ltd., the well-known machinery firm of Durban and East London, of a copy of their newly-issued “Catalogue of Advanced Agricultural Implements and Machinery,” we wrote for particulars of certain of the machines mentioned therein, as we

thought some reference to them in these pages would prove of special interest to our readers, in reply to which inquiry we received much fuller details than it was possible to publish in the catalogue. These particular machines were (a) the Single Dutchman Cultivator, (b) the "Champion" Planter with disc openers, (c) the "Ceres" Separator, and (d) the "Samson" Petrol Engine. Messrs. Malcomess & Co. also kindly furnished us with electros, by which we are enabled to illustrate these machines and engine. The catalogue itself is a very well-got-up and well-illustrated publication, consisting of a little over 100 large pages. It is made especially easy of reference by the division of its index into nine sections, dealing respectively with (1) Ploughs, (2) Cultivators, (3) Planters, (4) Harvesting Machinery, (5) Engines, Thrashers, and Horse Gears, (6) Mealie Shellers and Grinding Mills, (7) Dairy Appliances, (8) Irrigation Machinery, and (9) Miscellaneous—which includes hay balers and forage presses, chaff-cutters, winnowers, potato sorters and cutters, dam serapers, tobacco cutters, wire strainers, drilling machines, and many other farm requisites. We have room here for no more than a reference to the particular machines mentioned above, but we advise readers to writ to Messrs. Malcomess & Co., Ltd., for a copy of their catalogue, which, we may add, is also issued in the Dutch language.

THE SINGLE DUTCHMAN CULTIVATOR.

The first implement in the catalogue before us to which we would like to draw readers' attention is the Single Dutchman Cultivator, which is built somewhat on the lines of the 'Captain Kidd' Cultivator—which is becoming more and more widely known in South Africa—except that the discs are replaced by shovels. This implement is probably the most up-to-date riding cultivator with shovels on the market, and is capable

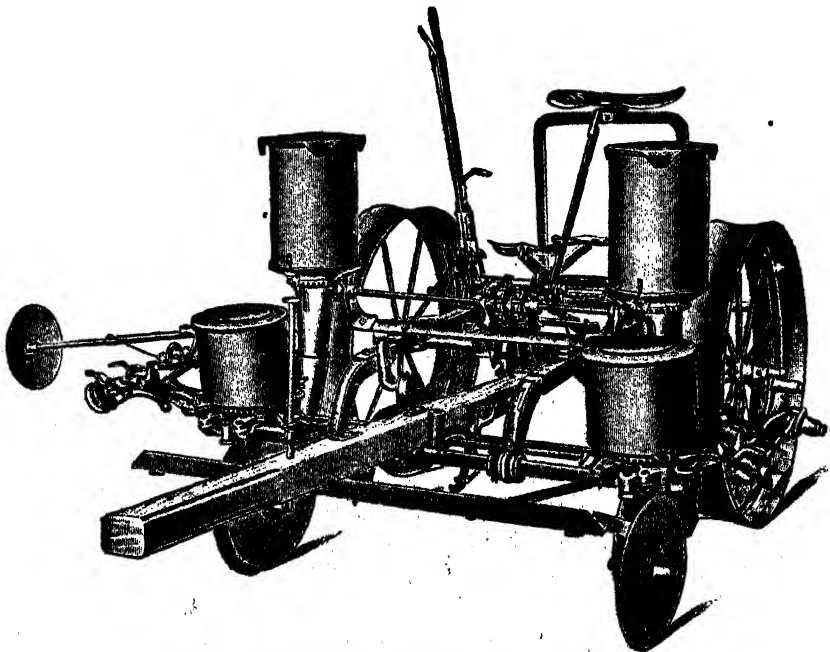


THE "SINGLE DUTCHMAN."

of an infinite variety of adjustments, besides being under the perfect control of the operator. Owing to the parallel gang movement, the shovels can be moved to the right or left as required to dodge crooked plants in the row by a slight movement of the operator's foot, and can be shifted out of the straight even as much as six or eight inches or back again whilst the cultivator is travelling forward about a foot. Now that so many farmers are using mules and donkeys in place of oxen cultivators of this description are coming into more general use, and it stands to reason it is a great advantage to have a riding cultivator in place of a walking cultivator, thus saving the operator to a great extent. The cultivator is fitted with concave wheels and dust-proof hubs.

THE NEW "CHAMPION" PLANTER.

The "Champion" Planter needs no introduction to South African farmers, the success of this machine having been phenomenal and thousands being now in use in this country. Readers will be interested, however, to learn that this planter is now fitted with revolving disc openers instead of runners; and the opinion of farmers is that in many classes



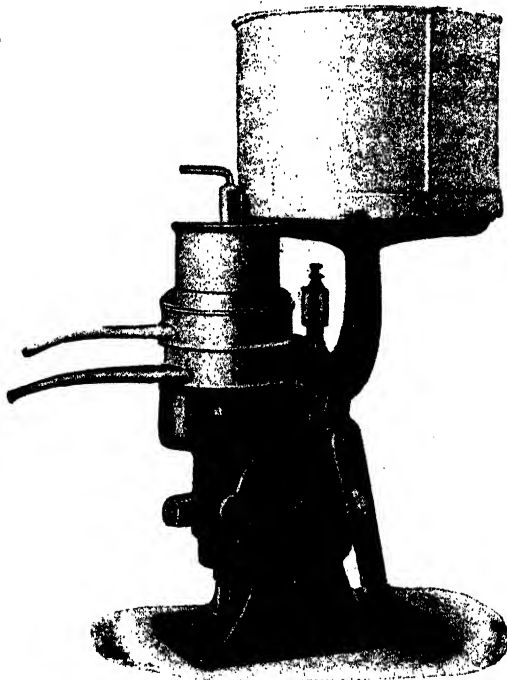
THE "CHAMPION" WITH DISC OPENERS.

of soil this is a great advantage, as it prevents clogging, and insures a more uniform depth of planting. The discs are also able to cut through old stalks or roots or similar obstacles more effectively than can the runners. The accompanying illustration shows the machine as it now appears.

In this connection we learn that Mr. Sidney Moon, of Manderston, who was recently so successful in carrying off the championship prize and numerous other awards for maize at the Johannesburg and Bloemfontein shows, uses exclusively the "Champion" Planter for planting his mealies, and speaks in the highest terms of praise about this machine.

THE "CERES" SEPARATOR.

The "Ceres" is a new separator that has come to stay. According to reports which Messrs. Makomess have received on tests conducted at the Nel's Rust Dairy, the Natal Creamery, and the Tweespruit Creamery, this separator seems to be about the cleanest skimming separator now on the market, the percentage of butter-fat left in the milk being as low as 0.02. This separator is fitted with self-balancing bowl, which,



THE "CERES."

acting on the same principle as does the spinning top, automatically centres itself when in motion, thus insuring that the bowl will always run perfectly true even though the separator itself may be standing a little out of plumb. It is, we think, a well-recognised fact that the most efficient separating device consists of a series of discs so arranged as to separate the milk into thin radial layers, but the objection to the use of such discs in the past has been that they have to be placed in the

machine in a certain order of rotation, thus making the machine complicated and difficult to clean and handle generally. This disadvantage is entirely overcome in the "Ceres"—which is fitted with this disc separating device—as the discs can be placed in the machine in any order whatever. It has a further good feature in the central oil device, which automatically feeds the oil to the different bearings, and the loose spindle which obviates the necessity for replacing the whole bowl when the spindle becomes worn.

A new and interesting device has been fitted to the "Ceres" milk and cream cans which helps to resist the formation of rust inside the cans. This device consists of a small disc of a certain alloy fitted in the bottom of the can which has the effect of creating a galvanic action which absorbs the electric ions, these ordinarily causing the rust to

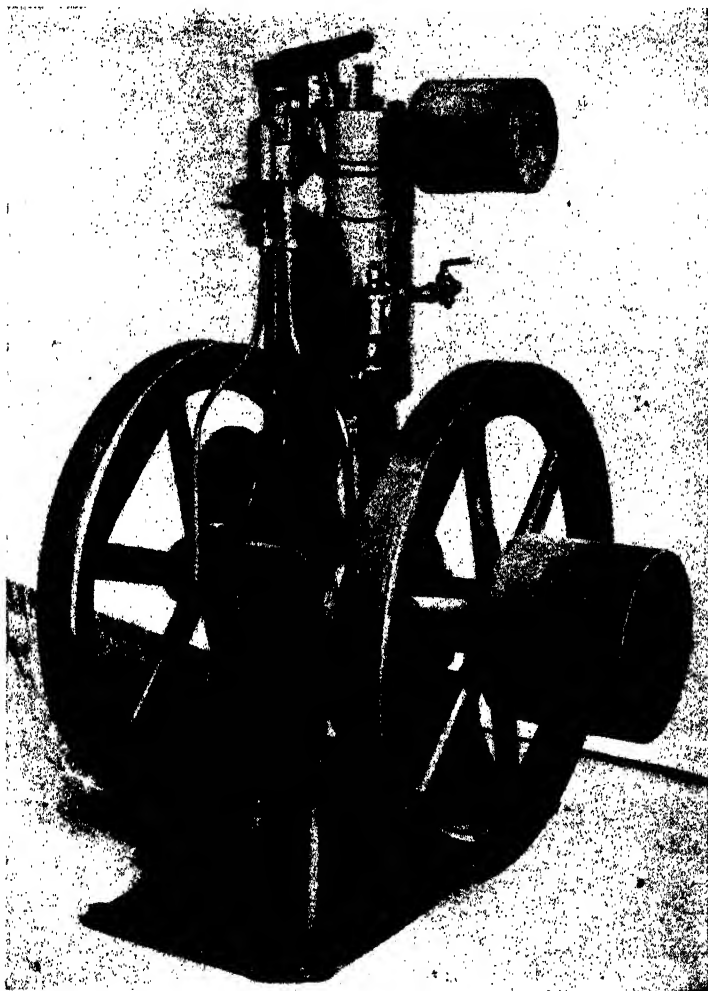


form. This disc does not in any way alter the general appearance of the can nor affect its strength or durability. It requires no attention in use beyond keeping clean, and does not increase the price of the can. It is proving a most successful and valuable addition. The accompanying illustration gives an idea of the general appearance of the can.

THE "SAMSON" PETROL ENGINE.

At the Durban Show Messrs. Malcomess & Co. exhibited a useful little engine for farm purposes which visitors there will probably remember attracted a good deal of attention, and for which we think there will be a good demand in this country in the future. This engine, an illustration of which we give herewith, is known as the "Samson" Petrol Engine, and one of its great advantages is its extremely moderate price. It can be worked on petrol, Natal alcohol, or similar fuel, and starts by

means of an electric spark furnished by a battery (which is provided with the engine) in a similar way to which a motor starts; turn on the current, give the starting handle a turn, and the engine is running at



THE "SAMSON."

once; there is no trouble and no delay. It runs equally well a full or a light load. It has a low fuel consumption, and is made in three sizes—i.e., 2, 4, and 6 B.H.P. It can be used for driving pumps, shellers, chaff cutters, grinders, or any similar small farm-machinery. The prices run from £30.

As stated earlier in this article, we have been making inquiries overseas regarding two other machines, some details of which

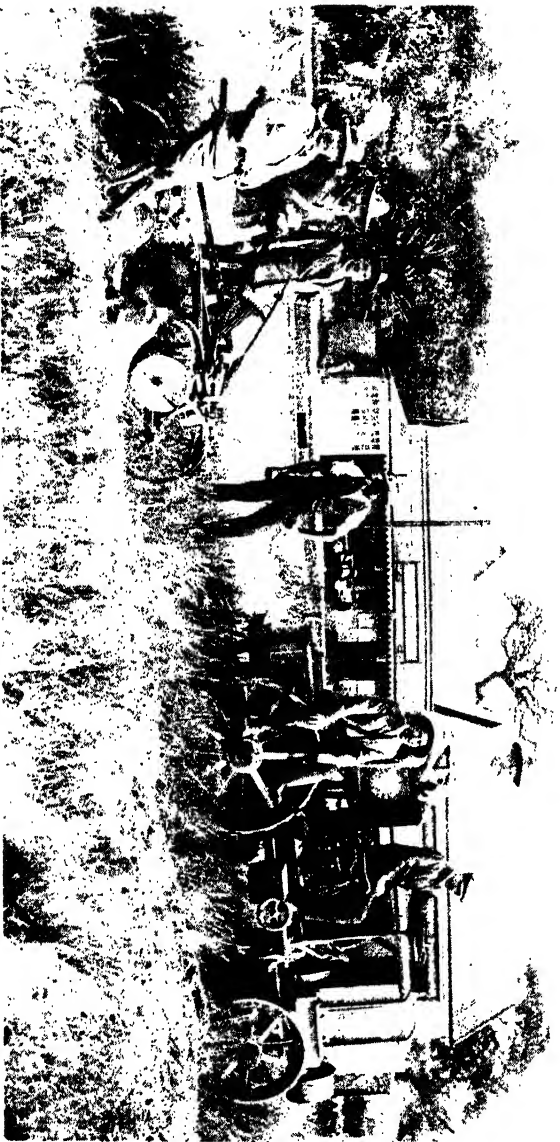
we thought would prove interesting to some of our readers. There are: (1) A New Decorticating Machine, and (2) a Peanut or Earthnut Thresher.

THE BURN DECORTICATING MACHINE.

The Burn Fibre Decorticating Machine came to our notice as a result of a paragraph appearing in the *Philippine Agricultural Review* of December last. As this paragraph briefly describes the machine we set it out here as we found it:—

"Messrs. Burn & Co., Ltd., of Calcutta, India, have, through their representative, Mr. A. W. Prautsch, made application to the Division of Archives and Patents of the Executive Bureau for a patent on their new hemp-stripping machine which they believe is superior to everything else of the kind at present on the market. The machine put out by this company is said to have been operated successfully all through India. The capacity of the machine is claimed to be 1,000 lbs. of hemp per day; the hemp is fed at the top of the machine, through three corrugated rollers which are placed in the shape of a V. At the end of these rollers it is clamped and run through a single set of strippers revolving on a wheel that makes 1,000 revolutions per minute. At the point of contact with the strippers a powerful stream of water plays on the hemp just as it reaches the strippers, and another stream cleans from the fibre, when it passes the knives, any pulp that has not been previously removed. After this simple process the hemp falls on an endless chain about 3 feet wide, which carries it back within a few feet of the starting point."

Seeing this paragraph, we thought it well to write to Messrs. Burn and Co., Ltd., for prices and an illustration of the machine. In the course of their reply Messrs. Burn & Co. state:—"This machine has been designed to treat the fibrous leaves of the great family of *Agaves*, particularly the Sisal variety; and it decorticates these leaves better and more perfectly than any other machine that we have yet seen or heard of. . . . We have had, through the kindness of a friend interested in fibre extraction, forwarded to us from Manila, in the Philippines, some stalks of the *inedible* banana variety, growing there in abundance and commonly known as the Manila hemp stalks, to experiment with in our machine. These stalks, which were about 14 feet in length, were put through one of our machines and were decorticated most successfully, the result being more and better fibre with less waste than from any other machine he (our friend) had ever seen. We profess, therefore, that our machine is capable of treating successfully plants of the agave family and stalks of the hemp variety referred to above. In fact, it can treat with more or less success almost all plants of pulpy (as opposed to sticky) nature, such as Agave or Banana."



PLUGHING BY MOTOR.—1.

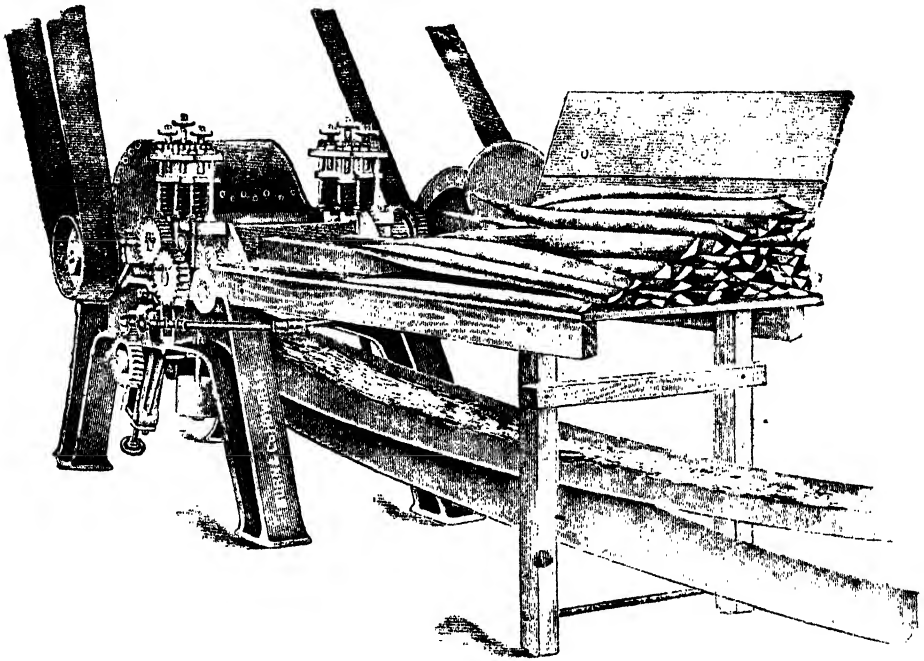
Messrs. G. North & Sons, of Durban, recently made a trial with their new Saunter's Universal Motor—which, some of our readers may remember, they had on Exhibition at the Durban Show. The Motor is driven by petrol or alcohol, and is reasonable in price. A second illustration shows the ploughing trial actually in progress.



PLUGHING BY MOTOR.—II.

The above illustrates a ploughing trial made by Messrs. G. North & Sons with their Saunders' Universal Motor, shown in a previous picture. The plough used was their "Colonial" three-furrow, which has recently been altered somewhat in certain matters of detail. The land selected was hard, and was turned over to a depth of from 4 to 8 inches.

The accompanying illustration, kindly supplied by Messrs. Burn and Co., gives an idea of the general appearance of the machine.



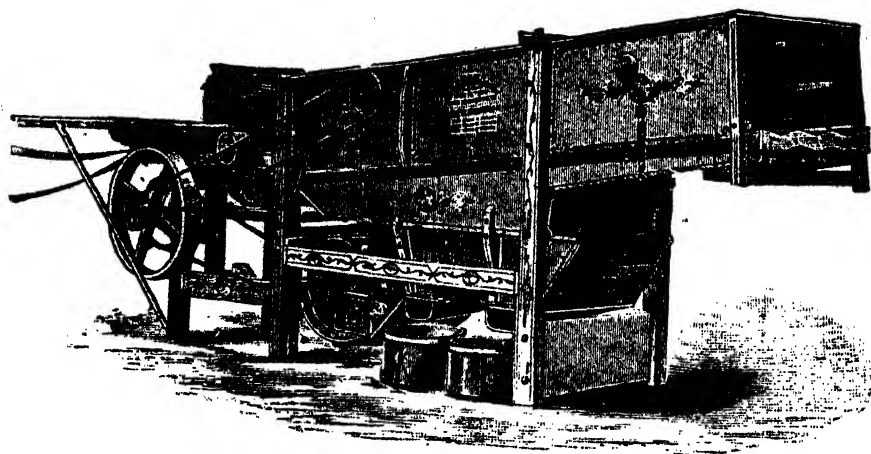
THE "BURN" DECORTICATOR.

The price of the machine, complete with countershaft and pulleys packed and delivered f.o.b. Calcutta is, we learn, £276 13s. 4d. (Rs. 4,150). The nett weight of the complete machine is 63 cwt., and the gross weight in packages is 65 cwt. Shipping measurements are 305 cub. ft., or, say, 6½ tons, taking 50 cub. ft. to the ton. Messrs. Burn & Co.'s address is Howrah, Bengal.

AN EARTH-NUT THRESHER.

The second machine about which we have made inquiries is an earthnut thresher manufactured at the Ellis Keystone Agricultural Works (Mr. George C. Burgess, general agent, Petersburg, Va., U.S.A.). We noticed a paragraph in the *Barbados Agricultural News* with reference to this thresher, and as machines for threshing earthnuts are by no means common we thought inquiry into the matter would prove interesting. Mr. Burgess has sent us some particulars and an illustration of the machine—which latter we reproduce herewith. The particulars furnished are not as full as we could have liked, but it appears that the thresher is

made in three sizes, numbered 1, 2 and 3. It appears, also, that the machine is run by horse or mule tread power, and that the same machine can also be used for threshing all kinds of grain by using a special at-



THE ELLIS KEYSTONE EARTH-NUT THRESHER.

tachment made for that purpose. The peanut thresher can also, judging from some of the printed testimonials accompanying the catalogue we have received, be used for threshing cowpeas, and it is quite probable—though it is not so stated—that it would do for soy beans as well. On this latter point we have written again to Mr. Burgess, and will publish his reply in due course. A machine that will thresh soy beans will undoubtedly be a great advantage; in fact, we shall have to have some such machine before long if the industry makes good progress. Unfortunately we are unable to quote the prices of the thresher, as the catalogue does not mention them, but we are inquiring on this point also.

In the course of his letter Mr. Burgess says:—"Peanut growing has gotten to be one of our greatest industries here, and, while the crop for the past few years has reached the million bushel mark, the industry is still in its infancy. All of the worn-out land which would scarcely produce anything else will make good peanuts by using commercial fertiliser. One of the biggest drawbacks to raising them here is the scarcity of labour to pick them off, but since the introduction of our machine this has been eliminated."

The Structure of Sugar Cane.

ITS INFLUENCE ON MILL WORK IN FACTORIES.

THE Experiment Station of the Hawaiian Sugar Planters' Association has, according to the *West Indies Agricultural News*, issued its thirtieth bulletin under the title of "The Influence of the Structure of the Cane on Mill Work in Sugar Factories," by the well-known authority on the sugar industry, Noel Deerr. We have not received a copy of the bulletin ourselves, but we are enabled by an article appearing in a recent number of our West Indian contemporary to give a short resume of its contents, which, we think, will be read with interest by planters and others in Natal.

The work is divided into three parts: A discussion of the influence of the different juices contained in the cane on control work; an account of some experiments made with the object of determining the effect of different methods of extraction; and a consideration of the cane as being composed of pith and rind, so that these are regarded as separate entities when dealing with the results of milling operations.

The first part commences with the consideration of the inferential method of controlling the weight of cane entering the factory which is due to Geerligs, namely, that the percentage of sucrose in the cane, divided by the percentage of sucrose in the first mill juice, gives the constant quotient 0.85, under certain fixed conditions. As the author points out, it is evident that this can only hold under constant circumstances of mill pressure and fibre content of the cane: as the proportion of juice obtained from the cane increases, and at the same time approaches more nearly the composition of all the juice contained in the cane, the value tends to increase: its value will become smaller, on the contrary, with an increase in the fibre content of the cane. This was recognised by Geerligs, and attention is drawn to a table which was constructed by him for the purpose of giving the various values of this quotient with different mill pressures and fibre contents, in the case of the Cheribon cane. Other investigators found different values for the various canes that were used under the conditions with which they had to deal, and this led the author to determine those for the chief canes employed for sugar-making in Hawaii; these are given in the bulletin, and it is shown that the quotients for Hawaiian canes are very similar to those for the Cheribon cane. The practical use of the figures obtained is to indicate that, in factories where the sucrose content of cane is determined by working back from the sucrose in mixed juice and that in megass a low value will show

that either the weight of cane recorded is too high, or that the measurement of the amount of juice is inaccurate.

In employing his experiments to find the value of the quotient of which mention has just been made, the author worked out the ratio between the solids in what he terms the "absolute" juice of the cane and those in the expressed juice. By the absolute juice, he means "everything which is not left behind on extraction with water," so that this term includes protoplasm, together with the "colloid water" of Geerligs, and the "water other than juice," as it is described by Dr. Francis Watts (see *West Indian Bulletin*, Vol. IX., p. 85); that is to say, absolute juice comprises the sugar-bearing juice of the cane, as such, protoplasm, and what is usually understood by "imbibition water," in a botanical sense. (Returning to the relation just referred to—that between the solids in the absolute juice, as defined, and those in the expressed juice—it was found that this was far more constant than the quotient which was first under consideration, namely, that obtained by dividing the percentage of sucrose in the cane by that in the first mill juice. This is shown by the fact that, for at least three varieties of cane, with a fibre content varying from 10 per cent. to 1.1 per cent., it was found to lie between the values 0.97 and 0.98. The practical development of this is that, if the density of the absolute juice of the cane is known, then, with the usual results of analysis alone, all the essential measurements relating to mill control can be expressed in terms of cane; and if either the weight of cane, of megass, of mixed juice or of added water has been determined, all the other quantities can be found. It is not suggested that the making of direct measurements should be discarded in favour of an inferential method; but that the latter should form a means of checking such measurements, and the author proposes, in the light of the determinations made by him, that the value of the ratio employed for the purpose should be 0.977, laying stress at the same time on the necessity for accuracy in the determination of the total solids in the megass, before reliable results can be obtained.

As has been stated, the second part of the bulletin deals with the effect of different methods of extracting juice; the difference of these methods consisted in using nine and twelve-roller mills, maceration with hot and cold water at different stages in the milling, returning or not returning the dilute juice, and the application of increasing extractions. It was found that the highest extraction was obtained when the water was added in divided quantities; the result was lowest when its addition took place before the last mill, and was intermediate when it was divided before the second and third mills. There was little difference found, whether the water was hot or cold; a slight advantage obtaining when it was hot was probably due to the slightly greater dilution. The compari-

son of the work of a nine-roller and a twelve-roller mill led to the conclusion that, making allowance for difference in fibre content, the latter effects extraction from 50 tons of cane per hour as well as a nine-roller mill dealing with 35 tons in the same time, with a dilution in the case of the larger mill, of 12 per cent. instead of 34 per cent. It is the author's opinion that the matter of chief importance in these trials is the economy effected in the case of the twelve-roller mill, as a result of the greater quantity of cane dealt with and the smaller amount of liquid to be treated, on account of the lessened dilution. In the last connection, it was not found that any approach to equality of final efficiency of work in the two cases could be obtained by using less water; the effect was rather to gain very inferior results with the smaller mill.

The object of further work was to ascertain the influence of high extraction on the purity of the juice: in other words, to find the effect of expressing increasing quantities of juice from the cane on the amount of sugar that could be obtained. The average results of experiments showed that an extraction of 93.0 may be considered to correspond with a purity of 89.0, and an extraction of 87 with one of 90.6. By interpolating values and extending the extraction numbers to 95.0, a table is obtained in which, while the latter increase by unity, those representing the purity decrease by 0.2 in the first, fourth and seventh steps, and by 0.3 in the others. Thus extractions of 90.0 and 95.0 correspond, respectively, to purities of 89.8 and 88.5, so that increasing extraction from 90 to 95 does not increase the amount of sugar that can be obtained in the ratio of 95 to 90, but in that ratio multiplied by the quotient obtained by dividing 88.5 by 89.8. In other words, the increase in available sugar, calculated from the extraction alone, would be 5.6 per cent.; it is actually 4 per cent. The subject is developed by the author, who, however, in view of the conditions peculiar to any given factory, does not deal with the financial aspect of high extraction, but leaves the data brought forward by him to be worked out on the basis of money units in any special case.

The third part of the bulletin, namely, that which treats of the effect of the structure of the cane on mill work, is to be dealt with in another issue of the *Agricultural News*, and we will refer to it upon receipt of that number of our contemporary.

The cows which produce best are usually those which were well prepared for their milking period. Breed and strain or family are important factors, but important and necessary as they both are, neither, in itself, is a guarantee of production.

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

By MISS A. E. PULLINGER, *Secretary*,

"The Apiary," Malvern.

WINTER is rapidly passing, the days are lengthening, and joyous spring will soon be here. Brood is increasing, and whole combs of sealed larvæ may now be found even on the outside of the brood nest of strong colonies. Hives should be overhauled and cleaned of propolis in order that all fittings may be easily handled when the necessity for the removal of honey occurs. I would suggest maintaining the winter (restricted) entrance to assist the bees to keep up the necessary heat for brood-rearing and comb-building, so very essential at this time for the days, and the nights particularly, are still decidedly cool. Care and attention towards the bees at this time is very important, for it is our greatest effort towards a successful season—and the production of those "tons of honey," of American bee literature. Our bees must be teeming with life, energy, and numbers in order to make the utmost of even a possibly poor season. It is too late when the honey flow is already upon us; we must assist Nature at this time all we possibly can.

* * *

Honey is being brought in from the mangoes, gums being also in bloom, but the weather is too cold, and the few warm hours of the day are too short to assist the bees very much; in fact, it is almost a tax on the bees to gather much surplus honey at this time of the year. Some vigorous stocks will build up well, and be ready for early swarming. Spring flowers are rapidly making their appearance above the burnt charred ground, a recent shower of rain forcing flowering plants into blossom. The bees are early at work, and on mild evenings may be seen coming in from the fields in great numbers just before darkness has set in. At this time foundation is quickly drawn out in the brood nest, a good opportunity to replace old black combs.

During this dry bright weather hives can easily be painted without in any way interfering with the bees, provided that the front parts be done early in the morning or late afternoon on cool days when but few bees are flying. In case of known vicious colonies, it may be advisable to have the smoker at hand and going well in order to prevent surprises in the way of stings—not usually appreciated by the majority of bee-keepers! Personally I have experienced little trouble in this respect, the bees appearing to in no way resent my close proximity to the hive. My bees, however, are particularly well behaved, not having had at any time a taste of stolen sweets! A good paint for outside work, bee hives in particular, I have found to be that which is sold as “Ferrodor”; this paint gives a smooth polished surface, and wearing qualities all that can be desired. The advantage of a polished surface will be evident to those bee-keepers who take particular pride in the general appearance of their apiaries, for the splashing of mud on the hives causing unsightly stains is at once washed off by the falling rain and the hives look always clean. It is a most durable paint also, from all accounts.

The Living Bee.

By MARY RITCHIE.

*President, Natal Bee-Keepers' Association; Natal Expert, South African
Bee-Keepers' Association.*

(Continued from Page 231.)

A BEE ADVENTURE.

“THOSE bees are ours,” we exclaimed, but we spoke hastily as enthusiasts sometimes do. They were hanging from the high gable roof of an up-country vicarage—a single storey building, it is true, but built on sloping ground with a high verandah. It cricked our neck even to look up at them where they hung, a beautiful brown mass, building their combs in the open sunlight.

One ladder was too short, but two would reach them. These were lashed together, and after some engineering attached to the chimney. It was Bessie's turn to cut down the comb, and the fact that it was a long climb and a stiff one first, added zest to the prospect. She ascended with the smoker and soon had the bees clustered nicely into a compact mass. At this point, unfortunately, the juncture of the ladders showed an ugly elbow and there was little doubt that one side was giving way. We recalled Bessie to mother-earth and summoned the Kafir boy to retie the knots. At first he thought we meant him to go up for the bees, and "Ca Inkozazani" was very decided. He had tied the ladder to the chimney the night before and knew these bees. However, after a little coaxing, he went up and fastened the ropes. There is no doubt that the bees murmured, but we were too far below to hear them.

Bessie ascended again, this time with a basket for the bees, and a knife with which to cut the comb. The knife she put in her belt, but as it looked highly dangerous we attached it to one end of a long string and the other she fastened to her wrist. Step by step we watched her ascend till she was safely past the wide place between the ladders. The Kafir steadied the foot, those with bee-veils stood clustered round, while a group fearful, but interested, stood further off.

She had reached the top, planted herself firmly, and was drawing up the knife when to our utter dismay the enemy opened fire. In our anxiety about the ladder we had overlooked the danger from the bees. It is well known that hive bees are fiercer than those in a house apiary—the shelter seeming to subdue them—and these bees, working quite in the open, were fiercer still. The scent of that Kafir boy was in their nostrils, and the sound of fury in their wings. Poor Bessie! Her hands were bare, as she was no novice in handling bees, but that day she was given no opportunity to show her skill. The bees had first and only innings. In her perilous position she was completely at their mercy. Had her hands been covered she might have "played statutes" that is kept perfectly still and bidden them do their worst, but retreat was her only course.

With perfect coolness and no little courage she began to descend, but every move she made, every step she took, brought more bees to the attack. In companies, regiments, battalions they came, horse, foot and artillery, pouring in a merciless fire. "Hold on to the ladder and *never mind the stings*," I urged—advice which seemed to the others pitiless indeed. "*Never mind the stings*, and such stings!" But I was so afraid

that she would fall. The very ladder seemed possessed or why should it swing so? The Kafir in the excitement no longer held it, and not only that, but while letting out wildly on all sides to protect his head from the cloud of bees he kept banging it at every stroke. I counselled him to "hamba tshetsha." He needed no second telling. From the group in the garden came a burst of merriment; I was too anxious at the moment seeing Bessie safely to the ground to know what had happened. There was much laughter. Some say the Vicar put his head in a May bush, others that he made a bee-line for the gate. Once there he turned and laughed at the others who scattered now in all directions, as Bessie passed at the run, trailing the knife at her wrist, a cloud of angry bees in wild pursuit.

Under the gum trees we picked out the stings—twenty in one hand and twenty-two in the other. Small wonder she was the heroine of the hour. All gathered round very thankful that she was safe and vowing vengeance on the bees. The poor swollen arms were treated with strong ammonia as soon as possible, meantime they were tied up professionally, and with much palaver, in cool green leaves and yards and yards of linen bandage, a treatment that proved most successful, for their appearance was so amusing that Bessie quite forgot the pain and joined heartily in the general laughter—in short was one of the happiest at the dinner table.

We are going again to that Vicarage garden to tackle those bees, but whatever further adventures we may have I am quite sure if we ever succeed in putting them in the hive, they will be christened "Bessie's Bees."



S.A. Citrus Fruits and Meat in London.

The following reports have been received from the Acting Trades Commissioner for the Union in London (Mr. Francis Harrison) on citrus fruits and frozen meat from South Africa:—“(1) I beg to report that the following South African citrus fruit was received by the last mail boat, “Edinburgh Castle,” and placed on the market on the 11th instant:—From Natal: In cool chamber, 432 packages naartjes; in hold, 129 packages oranges; total, 561 packages. From Algoa Bay: In hold, 45 packages oranges. From Capetown: In hold, 41 packages oranges. (Approximately 2,000 “trays” naartjes and 300 cases oranges.) (2) It is satisfactory to state that the fruit, with very few exceptions, arrived in an exceedingly good condition. No naartjes were offered for sale at auction, those consigned to Messrs. Garcia Jacobs being handed over to private salesmen for disposal. (3) Owing to the large quantities of strawberries and cherries now on the market there is not a very brisk demand either for naartjes or oranges, but the following weeks should see an improvement. (4) The prices for naartjes vary according to the quality of the fruit and size of tray, the small trays, containing counts of 12’s and 15’s making 1s. to 1s. 3d., the medium sized trays containing about 20 fruit making 1s. 6d. to 1s. 9d., and the larger trays containing from 25 to 35 making from 2s. to 2s. 6d. (5) I noticed some very good quality ‘Navel’ oranges from Wellington, Cape Colony, packed in single layer trays which realised as high as 3s. per tray. (6) Another mark of ‘Navel’ oranges from the Cape made from 15s. to 17s. 6d. per large case. In a few instances a higher price was demanded. (7) The Washington ‘Navel’ oranges from Natal were brighter in appearance but still lacking in size compared with Californian’s and those from the Cape, which is reflected in the lower price at which they were sold. It would be advisable for Natal growers to take every possible means of cultivating a larger fruit of this seedless variety. (8) The ordinary oranges from Natal realised from 5s. to 6s. per case, containing from 50 to 90 fruit. (9) It is gratifying to note that up to the present the citrus fruit from South Africa has arrived in much better condition than last year, the selection is greatly improved, and the packing leaves little to be desired.”

Under date 8th July, Mr. Harrison reported:—“(1) There was an increased consignment of Natal naartjes on the market this week. The fruit arrived in splendid condition and generally of fine quality, which was favourably commented on at Covent Garden. (2) The prices realised for large trays are from 2s. to 2s 6d. Some small trays, I am informed,

have been bought for 1s. 3d. a tray. (3) Mr. T. J. Pourpart also had on sale a lot of 400 trays, and has disposed of them at 2s. to 2s. 6d. per tray. (4) Oranges from Natal arrived in good condition. (5) A small number of boxes of specially selected Victoria oranges realised 7s. per 24 fruits. (6) The Navel oranges from the Cape Colony are much superior in size and appearance to the Natal variety, and consequently obtained better prices. (7) The prices realised for Natal Navels were from 4s. to 7s. per small box. Cape Navels (84's to 90's), 15s. to 17s. 6d. per large box, and Natal ordinary oranges (small box), 4s. to 5s. 6d."

The Trades Commissioner reports as follows on the carcase of ox shipped by J. A. Stevenson, East London, per "Edinburgh Castle," arrived Southampton on the 9th July, 1910:—"(1) This small shipment of frozen beef was consigned to Mr. W. Cooper, and sold at the Central Markets on Tuesday morning last. (2) The beef weighed 126 stone, and was sold as one lot, realising 2s. 4d. per stone—3½d. per lb. On the same date Argentine, Australia and New Zealand beef (frozen) sold for 2s. 1d. to 2s. 3d. hind quarters, and 1s. 8d. to 1s. 9d. fore quarters. (3) A bigger consignment of frozen beef from Natal was sold at Smithfield in June, 1908, at 2s. 3d. per stone hind quarters and 1s. 10d. fore quarters. Mr. Cooper reports that the beef arrived in good condition, and that the quality was if anything superior to that from the Argentine, Australia, and New Zealand. He recommends, however, that future consignments should not be hard frozen but chilled. Mr. Cooper is also of opinion that younger beef should be shipped. (5) Had this trial consignment arrived two months earlier it would probably have realised 2s. 11d. per stone for fore quarters and 3s. 5d. per stone for hind quarters, which was the price then current for frozen beef. The cold weather is a better time to land meat in this country, June and July are a bit too late. (6) No great fault was found with the dressing, but it may be useful to repeat the recommendations made by two well known salesmen in respect to the Natal shipment in 1908:—J. W. Curry, of J. W. Curry & Co., 273, Central Meat Markets:—"The sides should be quartered at the 10th joint, and follow the bone right along to the flank. Also cut the tail short, leaving about two bones on the hind quarter. H. J. Webb, 329, Central Meat Market, E.C.:—"It would be more profitable to cut the hinds say 9½ instead of 7½ bones, as the hinds always realise more per stone than the fores. Mr. Webb also expresses the opinion that the beef from Natal would eventually be much improved by importing Hereford and Shorthorn stock. What is wanted on the market is young beef. (7) Mr. Curry, who handled the Natal frozen beef, made the further recommendation that South African beef should be distinctively graded in the same way as Argentine beef, so that buyers should accustom themselves to certain brands."

"(8) In connection with future shipments, the above salesmen can be recommended. Mr. Cooper, although having a good reputation as a fresh meat salesman, does not, to any great extent, handle chilled or frozen meat. (9) An appreciable notice of this small consignment appears in the current issue of the *Meat Trades Journal and Cattle Salesman's Gazette* in which the following pertinent remarks are made:-- 'If our African friends wish to cultivate this trade, they would be well advised, however, to send the beef of younger cattle, say, not more than two or three years old. Again, it would be of considerable advantage to the sender of the beef if it could be brought chilled instead of frozen hard. Australia and Argentine send us chilled beef, so there can be no difficulty in bringing it in a good condition from South Africa, provided shippers will put their steamers in order to adopt the latest refrigerating methods.' (10) Chilled beef always realises more than frozen, especially the hind quarters, which fetch anything from 5d. to 9d. a stone better price. The Agricultural Department would do well to take up this question with the steam ship company before future shipments are made. The temperature at which the present consignment was carried varied from 15 to 19 degrees Fahr. The usual temperature at which chilled meat is carried from the Argentine is from 28 to 29 degrees Fahr."

Hay Harvesting Machinery.

SOME NOTES BY AN EXPERT.

THERE are many different types of hay-making machines now on the market. A few years back the tedders or kickers had all the run, and large quantities of them were sold, and still are sold, all over the hay-growing country. These machines wrought with a pitching motion, kicking out from behind the machine when the horse moved forward, and going at a rapid rate, tossed up the green hay, and left it nice and open to both wind and sun. The tedder was found to do excellent work in timothy and meadow hay, where no seed was liable to be knocked off by the kicking action. But when working among ryegrass hay it was found to thresh out a lot of the seed, especially if the hay was nearly ripe when cut, and consequently tended to spoil the sample both for appearance

and also for weight. During the last three or four years tedders have given place to a great extent to swath turners and side-delivery rakes, more especially in districts where ryegrass and clover hay are cut. In a recent issue of the *Ironmongers' Chronicle* an engineering authority discusses these two machines—swath turners and side-delivery rakes—and has also something to say on the subject of hay-loaders. With regard to

SWATH TURNERS

the writer remarks that the advantage of this machine over the tedder is in the method in which the machine turns over the swath bodily, and doing its work gently and effectively, in no way threshing the grass. The swath turner takes two swaths at a time, the horse passing along between the rows in the same direction as the mowing machine, and two sets of forks revolving at right angles to the road wheels and adjusted to the proper height by a lever, lift up the swath at the butt ends, and turn it completely over without breaking up the formation of the swath as left by mowing machine. On most swath turners the forks are made to revolve either to the right or to the left at the wish of the operator of the machine. Thus, if a storm of rain comes after the machine has been over the crop and a fresh turning of the swath is required, the machine can be driven in the opposite direction, with the forks moving in the same way as they were at the first turning, and it practically puts the hay back into its original position. With an arrangement to produce the same effect, the swath turner can be made to windrow the hay when dry enough to stack, and this is done by having the two sets of forks revolving in an opposite direction, and turning two swaths outwards and on to the swath next. By missing a swath every time three swaths can be put into one, and even then are placed in such an open condition that the hay makes all the time until the hay-loader comes along, or the men with the wagon to take the hay to the stack.

SIDE-DELIVERY RAKES.

The side-delivery rake is a machine which was looked upon for a number of years in Britain rather scathingly, although extensively used in foreign countries. It is now being regarded by farmers with much more favour. The side-delivery rake is a tedder, rake, and windrowing machine combined. It is made to take two swaths at a time, similar to the tedder and swath turner, but is built differently, the rakes or forks being in one long row, and working at about an angle of 45 degrees. When required to ted hay the rakes are made to work backwards, and spread out the hay much after the style of the tedder. When required to windrow or rake the motion is reversed, and the machine then carries the hay forward, and being at an angle of 45 degrees the hay works off at one side of the machine into a windrow. Four swaths can, however, be put into one with a side-delivery rake. In some districts the side-

delivery rake is quite popular, but in Britain it is doubtful if it will ever supersede the swath turner, which is a great labour-saver to the farmer, and leaves his hay in much better shape than either the tedder or side-delivery rake. This last point may not be too clear to some people, but to secure a good sample of hay it must not be too much knocked about and twisted in all directions in the making, and this is where the swath turner excels over the other two machines.

HAY-LOADERS.

In connection with a swath turner or a side-delivery rake a hay-loader can be wrought to great advantage, especially in England, where the hay is taken straight from the windrow to the elevator and put into the stack. With a lot of haymaking to do a farmer can undertake a vastly greater amount of work with two of these machines working together than he could get through in the old way, of having it all done by hand. In Scotland and Ireland the method of hay-making is somewhat different to the English. Hay in both these countries is usually put up into hay-cocks of from 10 cwt. to a ton weight in the field, and is allowed to stand for a few weeks before putting into large stacks. Other machines are here brought into use which are not commonly seen in England—hay-cock lifters, triangles, and horse-forks.

Turkey Breeding for Farmers.

SOME USEFUL HINTS.

AN instructive article on the above subject appears in a recent number of the *Journal* of the British Dairy Farmers' Association. Mr. S. C. Sharpe, the author of the contribution, makes the following important observations:—

Turkey breeding for the farmer should be remunerative; there is money in it if worked upon right lines and with a system, and it is possible for anyone having some pasture and arable land to bring up a flock of turkeys with little expenditure. It is not necessary to lay out a huge sum of money in buildings and appliances, nor of buying incubators or foster mothers, because in practice they are not needed for hatching and rearing Turkeys, therefore it will be seen that the cost of starting turkey breeding need not be heavy. Home-made appliances cost a mere trifle, a house for stock turkeys made of poles sunk into the ground, some cross poles being used for the framing fastened with wire, and the whole thatched with straw; not an expensive place by any means, but

one which answers the purpose, and is far preferable to an ordinary poultry house. The houses should always be kept clean, and a little disinfectant put down occasionally will help to keep the place sweet and clean. Some good, clean straw should be used for bedding, and this can be renewed as often as necessary.

FEEDING.

Feeding is a very important point, and much harm is done very often by over-feeding the birds. They being good foragers generally pick up a great amount of food when kept around the farmyard, and do not therefore require much feeding. What food is given should consist of ground oats, middlings, and cooked vegetables, a little grain being given at night. The grain may be wheat or oats. The latter should be heavy, and of a white variety: they should weigh not less than 42 lbs. per bushel; if thin and light the birds will not eat them. I do not advise maize feeding for turkeys; it causes too much fat, and this must be avoided if one is desirous of getting fertile eggs.

We sometimes have a trouble with the hens when they come on to lay. There are plenty of eggs, but so many of them are shell-less. Of course this is useless for our purpose. We keep the birds all the year for breeding, and when they start to lay we hope to find eggs which will hatch out a batch of young birds in due course. When the eggs have no shells they are no use for sitting purposes nor for market. We often wonder what is the cause of this trouble, and how we can prevent it. I have frequently known hens to lay two shell-less eggs in one day. The cause of this is allowing the birds to become too fat: they get full of eggs, and are not able to shell them fast enough. This may go on for two or three weeks perhaps. Sometimes it happens that we have just one or two of the hens from a flock laying such eggs, while the others are all right. These birds should have a tonic, and a good dosing of Epsom salts; this, with a little reduction of food, will be found to stop them laying for a week or so, and if the diet is changed, and not quite so much given for a short time, the eggs will soon be normal and plentiful. I would advise that some meat be given if the birds have been kept on rather a low diet after the first few eggs have been laid. We generally find the trouble happens during the first batch of eggs, and we seldom have any difficulty of this kind during the second batch, the birds not being in such a high condition.

Another very troublesome thing we have to contend with in the hatching season is infertile eggs. Now this may be from two or three causes, more generally it is owing to the male bird being too heavy for the hens. It is not advisable to use a very heavy bird if the hens are not of great weight: a good vigorous bird of medium size is far more likely to fertilise the eggs than a monster of a bird; or, again, it may

be weakness. In such cases a little tonic and some good meat mixed with the food will improve matters.

HATCHING.

Hatching is best if done under the ordinary hen. The eggs should be taken from the turkey hen when laid, leaving just one or two for nest eggs, or she may find a nest away. The eggs may be kept for a short time, and then put down under hens in the usual way. It is best to wait until several hens are ready, and then put down a good number if enough hens can be procured, for in this way the rearing is much simplified; and should there be many eggs infertile, it is an easy matter to make some of the nests up with full number of eggs, starting the other hens with a fresh batch. It always pays one to test the eggs on the sixth day: and if the stock are rightly mated, and in good condition, there will be very few eggs found infertile. The hen must be dusted with some insect powder before putting her down on the eggs, for having to sit a longer time than usual, and it generally being warm weather, they are very liable to get infested with vermin, and if this happens it will mean some broken eggs during the period of incubation.

The hens should have good attention during the time, plenty of good food and clean water, with a little exercise once a day. If they can be taken off the nest and put into a crate or run it gives them some chance for movement, and they may be left off the nest for half an hour every day unless it is frosty, but fortunately we do not get very severe frosts when turkey eggs are hatching. About ten to twelve eggs may be put under a good large hen, if she is a reliable mother. All infertile eggs which have been tested out should be saved for cooking up for food when the young turkeys are hatched. If the hen is somewhat troublesome when the eggs are chipping it is well to take the batch away and put them under another hen if there is one to spare, or failing this they may be put in an incubator to finish off. It often happens that a hen may sit her eggs well at the time, but when the little birds begin to chirp she gets uneasy, and will smash all the birds as fast as they come out. The hen should not be taken off during the hatching if she is going on all right. If the hens have been handled every day, when taking off to feed it will be found that they are quite tame, and easy to manage when the young birds are hatching out; even the most wild hen will get tame and perfectly quiet during her sitting period if treated kindly, and this is a great help when the eggs are chipping.

It may sometimes be found that it is necessary to help the chick out of the shell owing to the membrane being hard and tough, but should this occur it is well to lightly sprinkle the egg with warm water, but if the following plan is adopted during the last fortnight there will be no trouble arise in this direction. Every morning, just before the hen is

placed upon the nest, have some warm water handy, and sprinkle a little underneath and on the breast feathers of the hen; she then goes on the nest, as in a natural manner, with her feathers wet, just in the same way as if she had been sitting in a hedgegrow, and had been out amongst the long grass hunting for a breakfast.

This causes a slight moisture on the eggs, which softens the membrane and makes so much easier. If the weather during the time the eggs are under the hen is very damp it will not be necessary to put water on her, but it should always be done in dry weather, especially if there has been a cold east wind blowing.

Division of Agriculture and Forestry.

FARM REPORTS FOR JUNE.

THE Farm Manager, Central Experiment Farm, Mr. W. C. Mitchell, reports to the Director of the Division as follows:—

Sharp frosts have again been experienced; on two occasions 11 degrees were recorded in the vlei. It is to be hoped that this will considerably lessen the damage done to next season's crops by the grub.

Towards the end of the month a milder spell of weather commenced, which had the effect of starting the barley and oats planted late in the northern vlei into renewed growth, and at time of writing these crops are looking well.

The work of baling and securing the bedding cut at the back of the Farm has been continued and is not yet completed. There should now be no lack of bedding until next autumn.

The mealie crop has been secured. Stalks were all brought to the shredder and turned into stover for the dairy herd whilst cobs had been previously husked in the field and are now lying in the crib ready for shelling.

One of the most interesting features of the Farm work for the past season has been the trial of root varieties on an extensive scale, and the results of this test have now been tabulated and are appended to this report.

The ordinary routine of garden work has been proceeded with during the month and a big supply of vegetables is now coming on. I regret, however, having to report considerable damage to early cauliflower varieties owing to severe frosts and subsequent attacks by aphides.

Spraying has been carried out with tobacco dip and soft soap for these insects and caterpillars have been destroyed by the use of arsenate of lead.

The donkeys previously loaned to the forestry branch have now been returned and are kept fully employed ploughing in readiness for the coming planting season.

With the exception of small ailments and accidents all stock are healthy and in fair working condition.

RESULTS OF EXPERIMENTS WITH VARIETIES OF ROOTS.

The locality where the crop was raised was on the hill side, west of avenue, with a gradual fall towards the west and north-west.

The soil is of a light ironstone grit, overlying a subsoil of Ecca shale and of exceptionally low fertility. Its one redeeming feature is its somewhat surprising hygroscopic qualities, a characteristic which is particularly valuable in the case of root cultivation when a large percentage of the crop's growth has to be made after the cessation of autumn rains.

The previous crop was buckwheat, sown without manure, from which practically no crop was obtained owing to severe damage by hail shortly before harvesting.

The treatment of the ground consisted of disc ploughing in October, after which all weeds were kept under control as much as possible by a constant use of the harrow. In early January the land was again ploughed and harrowed prior to planting.

Fertilisers consisted of 200 pounds high grade super. and 100 pounds muriate of potash per acre applied broadcast before ridging the land for seeding. A dressing of 100 pounds per acre of nitrate of soda was applied in March. One plot, planted with Goliath swede, also received kraal manure in addition at the rate of 8 tons per acre; this was spread on the land before the last ploughing and then turned under.

Seed was all procured locally and germinated well. One variety, Purple Mammoth turnip, appeared to be slightly adulterated with seed of wild radish, but otherwise few weeds have made their appearance.

Planting was all done in drills, on ridges. The fertilisers having been broadcasted on the harrowed ground, the land was ridged with a Martin's cultivator, using two double mould-boards.

Time of Planting.—Swedes were drilled during the third week of January, and turnips during the first week of February, with the exception of Purple Mammoth, which was sown during the third week of that month.

During growth weeds were kept down and soil moisture conserved by constant inter-row cultivation with peg-tooth scufflers. Rows were 24 inches apart and plants thinned to 9 inches in the row. This spacing may appear somewhat close, but it will be found that the advantage of

close rows, affording the plants an opportunity of forming an early shade of leaf which covers the entire ground, is one not to be overlooked in a dry climate.

The weather during growth may best be recorded by the following table:—

		Rainfall.	Temperature.		Mean temperature.	
			Max.	Min.	Day.	Night.
January	...	5'82 in.	95	50	76'3	56'2
February	...	7'48 "	94	46	76'5	55'6
March	...	4'79 "	85	44	75'7	54'8
April ...	...	0'73 "	82	29	72'8	46'1
May ..	...	2'63 "	82	25	71'6	36'4
June ...	...	0'17 "	77	21	66'5	28'9

It will thus be seen that the weather, both in the matter of rainfall and temperature, was altogether favourable, and it is to be regretted that the crops did not return better yields. All the swedes were very badly infested with aphides by the end of May, but it is not likely that this much affected the weight of the crop as growth had almost ceased by that time.

The weight of crop is recorded in short tons, and was determined by weighing portions of the plots in ten different parts of each. The weighings were taken in July. The following table shows the yield of each variety:—

Swedes:—

Goliath (kraal manure plot)	.. ..	21 tons 12 cwt. 96 lb.
Magnum Bonum	.. . . .	20 " 9 " 64 "
Carter's Prize Winner	.. . . .	19 " 10 " 28 "
Garton's Model	.. . . .	15 " 19 " 28 "
Goliath (without kraal manure)	..	15 " 7 " 34 "
Kangaroo	.. . . .	14 " 5 " 56 "
Kinaldie's Improved	.. . . .	14 " 4 " 24 "

Turnips:—

Devonshire Greystone	.. . . .	10 " 13 " 84 "
Green Globe	.. . . .	9 " 8 " 32 "
Purple Mammoth	.. . . .	8 " 5 " 44 "
White Globe	.. . . .	7 " 6 " 3 "
Purple Yellow Aberdeen	.. . . .	6 " 10 " 68 "
Green Top Yellow Aberdeen	.. . . .	5 " 11 " 76 "

Field notes of the varieties were taken at the end of July and are appended. Soundness of the variety is represented by a number. This should be read with 100, signifying thoroughly sound.

Goliath (kraal manure plot):—

Tops: Scanty to medium; colour, greyish green.

Necks: Medium to coarse.

Bulbs: Colour, purple with yellowish tinge on sun side; shape, round to round oblong.

Rooting: Medium deep.

General appearance: Somewhat patchy; badly affected with aphides.

Soundness: 75.

***Magnum Bonum* :—**

Tops: Abundant to medium; greyish green colour.

Necks: Medium.

Bulbs: Colour, purple; shape, good shoulder, round oblong to round flat.

Rooting: Shallow.

General appearance: Roots fairly uniform, infested with aphides.

Soundness: 97½.

***Carter's Prize Winner* :—**

Tops: Scanty; colour, light green.

Necks: Fine.

Bulbs: Colour, light to medium dark purple, yellowed on sun side; Shape: Oblong.

Rooting: Medium, inclined to double roots.

General appearance: Medium, badly infested with aphides.

Soundness: 70.

***Garton's Model* :—**

Tops: Very scanty; colour, light green.

Necks: Very fine.

Bulbs: Colour, reddish to purple, very much yellowed; shape, round.

Rooting: medium deep.

General appearance: Roots even in size, not so badly infested with aphides as some.

Soundness: 85.

***Goliath* (without kraal manure) :—**

Tops: Medium to scanty; colour, greyish green.

Necks: Medium to coarse.

Bulbs: Colour, purple; shape, round to oblong round, good shoulders.

Rooting: Medium.

General appearance: Medium, many small bulbs.

Soundness: 62½.

***Kangaroo* :—**

Tops: Very scanty; colour, light green.

Necks: Fine to medium.

Bulbs: Colour, light yellowish green; shape, oblong.

Rooting: Medium deep.

General appearance: Very even, not so badly infested with aphides as some of the varieties.

Soundness: 75.

Kinvaldie s Improved:—

Tops: Abundant; colour, light green.

Necks: Rather coarse.

Bulbs: Colour, greyish green to yellow green; shape, round.

Rooting: Medium deep.

General appearance.—Roots very considerably in size, badly infested with aphides.

Turnips—Devonshire Greystone:—

Tops: Medium scanty; colour, dark green.

Necks: Fine.

Bulbs: Colour, green with purplish tinge; shape, tapering to flat.

Rooting: Deep.

General appearance: Very fair, bulbs much exposed above ground.

Soundness: 85; very “fozy” but not much decayed.

Green Globe:—

Tops: Medium abundant; colour, light green.

Necks: Medium fine.

Bulbs: Colour, yellowish green; shape, round to flat, some tapering.

Rooting: Deep.

General appearance: Uniform, no aphides, bulbs above ground.

Soundness: 35.

Purple Mammoth:—

Tops: Abundant; colour, dark green.

Necks: Medium coarse.

Bulbs: Colour, dark purple; shape, flat.

Rooting: Medium.

General appearance: Good.

Soundness: 35.

White Globe:—

Tops: Medium scanty; colour, light green.

Necks: Fine.

Bulbs: Colour, white; shape, round flat.

Rooting: Deep.

General appearance: Poor, affected with eelworm.

Soundness: 40.

Purple Yellow Aberdeen:—

Tops: Medium abundant; colour, dark green.

Necks: Medium.

Bulbs: Colour, purple; shape, tapering.

Rooting: Deep.

General Appearance: Inferior; bulbs deep in soil.

Soundness: 75.

Green Top Yellow Aberdeen:—

This variety was in a very bad condition. Large patches completely destroyed by rot. No field report was taken.

In the above test it will be noticed that the application of eight tons of kraal manure produced an increase of over six tons of swedes per acre, whilst the keeping qualities of the roots were somewhat improved.

In the turnip varieties a southern type heading the list and two northern types at the bottom would appear to indicate the comparative unsuitability of the northern types for planting in Natal, but further tests must be made before coming to any definite conclusion.

The soundness of the crop was determined by selecting a strip of average appearance and splitting each root. Sound roots obtained two points, and points were deducted in proportion to the amount of blemish the root exhibited.

WEENEN EXPERIMENT FARM.

The Curator of the Weenen Station describes the month's work in the following report:—

Ground nuts were harvested early in June, and averaged 1,400 lbs. to the acre, a result that is good considering that no fertiliser was applied. Sugar beans were also harvested. From 100 lbs. of seed sown on one acre, a crop of 1,000 lbs. was reaped. One hundred lbs. of superphosphate was applied with seed in the drills. Lucerne was planted end of June in 12-inch drills and broadcast respectively as a comparative experiment; irrigation followed immediately, and at time of writing the plants are showing up well. A further application of water will be required early in August. Both sections were well graded, there being no trouble in obtaining a good lead of water. Grading of the bottom section abutting the donga has occupied the entire staff several days, but much more work has to be done here before irrigation can be economically applied. The drainage work is still incomplete, but cleaning the main drain has much improved the state of the ground. The wheat planted in May on the new blocks adjoining the Railway Station is now making rapid growth, several varieties being re-planted this season. Federation is again showing to advantage, being closely followed by the variety called Bobs. Marshall's No. III. is also making good growth. The Standard Fife and American varieties do not seem to be doing as well as the former, but on inspection the Standard Fife has stood the best. All barley plots are making good growth, also Yorkshire Hero peas planted at Main Station. These are now being watered. Irrigation of orchard and ploughing between rows of trees has progressed steadily. The Government Orchardist from Cedara paid a visit here in

July, and pruned all sections. The roots of the Tara fig were planted in the Nursery, and seem to have struck satisfactorily in spite of having travelled from Korea *via* England to Weenen by parcel post. Capri fig-cutting received last year from Cedara were in rather weak condition on arrival here, and, in spite of being carefully nursed, all failed. The citrus section has benefited by the irrigation applied at the latter end of June. All trees are free from scale, having been sprayed with McDougall's insecticide. At an early date I hope to have all the deciduous trees sprayed with Bordeaux mixture for leaf blight, and several other fungi. Six additional mules have arrived here in good condition for work at the Main Station.

Farmers and others who have a small orchard or kitchen garden should use this for chicken rearing. In a kitchen garden, coop the hens on the path, and let the chickens run over the gardens, and they will do well and thrive, and will clear off many insects and grubs.

SOFT- EGGS AND EGG-EATERS.—The soft egg disease, we had almost said—at any rate, it is a case where the organism of the bird is not performing its functions—can be, as a rule, cured after looking about carefully and ascertaining the cause. It may be over-feeding or improper food, but most likely it is to be found in a deficient supply of grit and shell—shell more especially. Spices and meat in excess will often induce it, and a deficiency of one or both of these will not do—either oyster or cockle—liberally; do not over-feed, and put a pinch of Epsom salts in the drinking-water. Give, if dark-coloured birds and no golden legs to spoil, the household ashes for a dust-bath. There is much shell-forming material in these. Also, for light and yellow legs, a barrow-load of clean sand. One evil of these soft eggs is that they are apt to be eaten by the birds, and creating a liking for them leads on to egg-eating, which is a most annoying and expensive habit when once a yard becomes affected with it. To detect the culprit, if only one, place an egg on the ground; the birds will soon begin to move it about, and the guilty lady will be the first to put her beak into it, when it is devoured quickly. To cure the flock, if any of them have acquired the pernicious habit, let them have an egg for a day or two, then carefully empty an egg and fill it with mustard, covering the aperture with stamp-margin. Let them have it: they will fight shy of eggs after that.—(*The Farmers Gazette.*)

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

ACCORDING to an Australian paper, a serious epidemic appears to have broken out amongst the poultry in Victoria, and it is reported that as a result thousands of birds are dying daily. The disease is of a mysterious character, and has not yet been identified conclusively. Experts appear to be unable to agree upon the subject; but some of them fear that the outbreak is due to poultry cholera. The principal symptoms of the epidemic are said to be total loss of appetite, and rapidly increasing stupor, which terminates in death. The attack is stated to be fatal within 24 or 30 hours. The rapid spread of the epidemic throughout the State has caused consternation amongst poultry breeders. It is reported that the disease first became prominent in Benalia district, and is now appearing in various parts of the State. Wild fowl, it is said, have caught the disease at Winton, and are there dying in great numbers.

Onions for Chickens.

Attention is directed by *Poultry* to the advisability of feeding onions to chickens. The tender and juicy part of the leek stem, generally rejected when the vegetable is prepared for home use, is very beneficial, and does well when chopped up and mixed with soft food for the birds. The tops of chives and scallions cut up, and the thinnings of the summer onion beds should all be utilised for chickens. Onions not only have a good effect on the lungs and bronchia, but they prevent many ailments to which chicken flesh is heir. They are far more beneficial for chickens—in fact, all kinds of fowls—than many people imagine. “We have again proved them to be of great service where gaps are feared, and this season we are using them freely in the food of some birds we are rearing on land that we were told was ‘poison’ to chickens. It is said that onions taint the eggs of hens which partake of them. They do, when the vegetable is overdone, and this can be very easily demonstrated. But it is not the case when they are given in a common-sense way; and they certainly do not flavour the flesh of chickens which freely partake of them.”

Herd Building.

Massey-Harris Illustrated gives the following as the “Seven Stones in Herd Building”:—(1) Milking clean—to obtain all that a cow can give, and to prevent early drying off. (2) Use of pure bred sire—from strain of large producers, to acquire good qualities and perpetuate dairy

tendencies. Of what value is a "scrub?" (3) Regular and careful feeding—as to time, quantity and quality; adjusting the grain ration to the production of milk and butterfat; to get the utmost value for the food-stuff grown or purchased. (4) Providing succulent feed—as roots, ensilage and soiling crops, to sustain and prolong the flow of milk. (5) Culling out poor cows: no one wants them either to feed or breed from. Beef them. (6) Good care—including kind treatment, and everything conducive to comfort, cleanliness and health so as to give the cow an opportunity to work to the best advantage. (7) Better methods, not necessarily much outlay of cash.

How to keep Eggs.

Says Mr. H. W. Jackson in the *London Agricultural Gazette*:— Properly-handled eggs may be kept quite easily and in excellent condition for several months, and at very little cost. Someone has recently risen up to say that if the hens are scientifically fed eggs can be kept indefinitely without any sort of preservative. This is going a little too far. It is a common fallacy that farm eggs are necessarily good. Infertile eggs are more likely to keep well than fertile. Hence if any considerable number are to be put up it is wise to remove the male birds and confine them. In warm weather it is better to gather eggs two or three times a day, as exposure to the high temperature of the ordinary poultry-house in summer may start the eggs on the way to spoiling before they are treated at all.

There are a number of preparations, such as lime water, salt, etc., which give good results, but the tests made show that a solution of water glass (sodium silicate) is more reliable than any of the other methods, and is so cheap and easily managed that there does not seem to be any excuse for taking chances with other methods of preparations. Water glass should be mixed with eight to ten parts boiled water, and poured over the eggs which have been carefully packed in earthenware jars. The cost of preserving eggs in this way is but little.

Horses' Teeth.

A writer in the *London Agricultural Gazette* for July 11th has some useful advice to offer with regard to the care of horses' teeth. If your horse shows difficulty in eating, he says, or loses flesh without apparent cause, it is time to examine the teeth. Very often elongated teeth prevent a horse from properly masticating its food, thereby rendering it impossible to obtain much benefit from it. Ulcerated teeth also are a source of great trouble and prevent a horse from eating well. Sometimes broken teeth cut the sides of the horse's mouth, and form painful sores,

which, of course, interfere with mastication. It is a good plan to examine the teeth of all horses two or three times a year, and in the case of broken or elongated teeth, treat them with a file. If the teeth of a valuable animal are badly affected treatment should be given by a veterinary surgeon.

Round Buildings for Agricultural Purposes.

Bulletin No. 143 of the University of Illinois Agricultural Experiment Station has just been issued, under the title "Economy of the Round Dairy Barn." Much that it contains is applicable in a general way, not to dairy barns only, but to other agricultural buildings. The chief advantages of round buildings are their convenience, strength and cheapness. In the first case, where they are used for cattle-feeding, it is easier to get the food from a central supply to the cattle, than it is in the case of a rectangular building. Such structures are stronger, because the ability of the timber used in making them to resist compression is taken advantage of to the greatest degree. There is the additional fact, which is especially important in countries liable to hurricanes, that, owing to their circular shape, all exposed surfaces can withstand wind-pressure better than flat ones; there is no hold for the wind, such as that provided by the gable end of a rectangular building. In the third connection, rectangular buildings were found to cost 34 to 58 per cent. more than round ones, according to their construction, in material used, with the same floor area, built of similar stuff.—(*Agricultural News.*)

How Manures affect Soils.

Mr. A. W. Hall, M.A., in the course of a contribution to a recent issue of the *Journal* of the Royal Agricultural Society of England, discusses "Some secondary actions of manures upon the soil." He concludes his article with the following summary of deductions:—(1) The long-continued use of sulphate of ammonia on soils poor in lime results in the soils becoming acid. (2) The acidity is caused by certain micro-fungi in the soil which split up the sulphate of ammonia in order to obtain the ammonia, and thereby set free sulphuric acid. (3) The infertility of such soils is due to the way all the regular bacterial changes in the soil are suspended by the acidity: instead fungi permeate the soil and seize upon the manure. (4) The remedy, as may be seen upon the Woburn plots, is the use of sufficient lime to keep the soil neutral.

(5) From the Rothamsted soils carbonate of lime is being washed out at the rate of 800 to 1,000 lb. per acre per annum, the losses being increased by the use of sulphate of ammonia, but lessened by dung or nitrate of soda. (6) Nitrate of soda, when applied to heavy soils in

large quantities, destroys their texture. (7) Some of the nitrate of soda gets converted into carbonate of soda by the action of plants and bacteria, and carbonate of soda, by deflocculating the clay particles, destroys the tilth. (8) The best remedies are the use of soot or superphosphate; the best preventive is the use of a mixture of nitrate of soda and sulphate of ammonia instead of either separately. (9) Soluble potash manures and comon salt may also injure the tilth of heavy soils through the production of a little soluble alkali by interaction with carbonate of lime in the soil. The remedy is to apply such manures in the winter or in conjunction with superphosphate.

Exterminating the Texas Fever Tick.

Farmers' Bulletin No. 378, of the United States Department of Agriculture, deals with methods of exterminating the Texas fever tick (*Margaropus annulatus*). It points out that, in taking measures for eradicating ticks, it is evident that the pest may be attacked in two places, namely, on the pasture and on the cattle. The method followed in freeing pastures may be either direct, in which all cattle, horses and mules are excluded from pastures until the ticks have died of starvation; or indirect, in which the animals are allowed to continue on the infested pasture, and are treated at regular intervals with oils or other agents destructive to ticks, so that the engorged females may be prevented from dropping and reinfesting the pasture. Two methods may be employed for the purpose of freeing animals of ticks; they may be treated with a substance that will destroy the ticks that are on them, or they may be pastured at proper intervals in fields which are free from ticks, until all those on them have dropped.

The time which it will take for the ticks in a pasture to die out, after the infested animals have been removed from it, varies considerably in different places, chiefly according to the conditions of climate and weather. Investigations conducted in Alabama show that it varies from five to ten months, in different parts of the year; farther south, the period is shorter. As a general rule, the time of infestation is lengthened by cold and moisture, and shortened by heat and dryness; other things being equal, high, unshaded land, which is dry, becomes free of ticks more quickly than land which is low, shaded and damp. In the instance under consideration, seed ticks will take at least twenty days to appear, after engorged females have been dropped. The chief condition which regulates the time that is required for all the ticks to drop, after cattle has been placed on clean land, is the temperature. In Texas, it was found that the time varies from six weeks in the warmer months to ten weeks in those which are cooler.—(*Agricultural News*.)

The Value of Weeding.

That it pays farmers well to keep their crops as free from weeds as possible was well illustrated by an experiment, tried at the University College, Reading, last season, on the effects of hoeing and hand weeding on the mangel crop. The results of the experiment were as follows:—First 8 rows singled only, second 8 rows hoed once, third 8 rows hoed twice, fourth 8 rows kept clean by hoeing, fifth 8 rows kept clean by hand weeding. The following represents the yield (per acre) of each of the plots for 1909:—Singled only: 1,667 roots, av. weight 4.1 lbs., yield p. ac. 30 tons 14 cwt. Once hoed: 1,549 roots, av. weight 4.8 lbs., yield p. ac. 32 tons 12 cwt. Twice hoed: 1,419 roots, av. weight 5.3 lbs., yield p. ac. 34 tons. Kept clean by hoeing: 1,508 roots, av. weight 4.6 lbs., yield p. ac. 31 tons 14 cwt. Hand weeded: 1,521 roots, av. weight 5.02 lbs., yield p. ac. 34 tons 2½ cwt.

The experiment has been carried out for three years, and it is understood that the 1909 results are not so striking as those of the previous two years. In 1908 the ground carried a crop of maize, and was thus left in a condition fairly free from weeds, owing to the successive hoeings that crop received. The following figures show the results for 1907, 1908 and 1909 respectively, and the total yield in each case:—Singled only: 1907, 15 tons 15 cwt.; 1908, 16 tons 15 cwt.; 1909, 30 tons 14 cwt.; total for 3 years, 63 tons 4 cwt. Once hoed: 1907, 33 tons 10 cwt.; 1908, 30 tons 5 cwt.; 1909, 32 tons 12 cwt.; total, 96 tons 7 cwt. Twice hoed: 1907, 37 tons 15 cwt.; 1908, 36 tons 15 cwt.; 1909, 34 tons; total, 108 tons 10 cwt. Kept clean by hoeing: 1907, 39 tons 10 cwt.; 1908, 38 tons; 1909, 31 tons 14 cwt.; total, 109 tons 4 cwt. Kept clean by hand weeding: 1907, 40 tons; 1908, 38 tons 5 cwt.; 1909, 34 tons 2 cwt.; total, 112 tons 7 cwt.

Rheumatic Troubles of Poultry.

A writer in the *Farmer and Stockbreeder* contributes a useful article on Rheumatic Troubles of Poultry. He says, *inter alia*:—The common title that is given to all cases of poultry losing the use of their legs is "cramp," but this is not an accurate description, because there are various forms of leg trouble, and they do not all arise from the same cause. It is generally supposed that all cases of inability to stand arise from the same cause, that is to say, damp; but this is not the case. Fowls suffer mainly from four forms of muscular leg trouble. There is first of all cramp, as applied to chickens and ducklings. Now this may be due to damp, insanitary surroundings, but it may also be due to physical weakness arising from constitutional debility, and it is most commonly seen amongst chickens and ducklings hatched in the winter

time when the egg germs are not so strong as they are at other times, and the cure for this is to adopt such a course of feeding as will strengthen the limbs and enable the frame to grow up strong. Should the trouble, however, arise from damp, then the cramp is rheumatic in its origin, and should be treated by warmth and by the use of some stimulating liniment. A great many of these cases of cramp amongst chickens and ducklings are due to their being kept on brick floors. It is no uncommon thing to find a farmer keeping ducks in a pigsty paved with a brick floor, which is, of course, about the worst possible thing for them. Such a floor should be covered with boards, and on the top of the boards should be put 2 or 3 inches of peat moss litter or dust, and then they would be perfectly warm and dry, and there need be no fear of cramp. Similarly with chickens, cramp often results from cold, damp floors, and it is far better to let chickens sleep on the bare ground than to put them to sleep on a cold brick floor, with perhaps a little straw littered over it.

Coming now to rheumatic trouble in older poultry, of course rheumatism is one of the recognised complaints to which poultry are liable, and if it is allowed to go on long enough it will degenerate into gout, because rheumatism is really due to a certain condition of the blood, which is induced by a particular course of feeding, and is encouraged by damp, unhealthy surroundings; and then the acids which form in the blood as a result are liable to concentrate themselves in the joints, and you get swollen joints in birds, just as you do in human beings. As a rule, however, the life of a fowl is not long enough to enable it to become gouty. Rheumatism, however, is fairly common, and the way to treat it is to use a stimulating preparation such as hartshorn and oil, or turpentine liniment or something of that kind, to the shank of the leg, and to give the bird a dose of quinine or some similar tonic. But there is one form of leg weakness which is not rheumatic, and which only affects laying hens, particularly young hens during their first season. This is what is known as ovarian cramp, and it is a muscular affection caused by the strain of laying, which seems to deprive them of the use of their legs. A young hen will often be found squatting down on the nest unable to move after laying, and if she be lifted off she will flutter across the yard, and seem to have lost control over her legs. All she needs is to have a little rest for a few hours, when these symptoms will disappear; but it is a wise plan in such a case to keep the bird on short rations in order, if possible, to check the development of eggs, because it is obviously desirable that laying should cease until the muscles have recovered their normal condition.

Making Bordeaux Mixture.

The *Agricultural Bulletin* of the Straits and Federated Malay States, for April, 1910, gives some useful advice on the making of Bordeaux mixture in an expeditious manner. The writer remarks that the making of Bordeaux mixture on a large scale from stock solutions is greatly facilitated if some simple plant be erected; and he proceeds to describe such a plant. The erection, he says, may consist of two elevated platforms. The higher platform is carried on four 9 feet 6 inches posts, 5 inches by 4 inches, sunk 2 feet 6 inches in the ground and well rammed. Joists, 5 inches by 4 inches, connect the heads of the posts, into which they are halved. An intermediate poist is halved into the middle of two opposite joists. The upper platform is 5 feet square, and consists of 6 inches by 1 inch boarding in the rough, laid to the edges. The lower platform, which is 6 feet 6 inches square, is similarly constructed, and is carried on sleepers, 6 feet long and 10 inches by 5 inches, set vertically and sunk 2 feet 6 inches in the ground and well rammed. The two structures are bolted together at the two back posts, and where the front post of the higher platform touches the joist of the lower platform.

On the higher platform, the article continues, are two 50-gallon dilution barrels, marked inside at the 50-gallon level, and fitted with taps. If possible, water should be laid on this higher platform. On the lower platform stands a vat (fitted with a tap) capable of containing 100 gallons. A short length of hose (canvas hose is convenient to use) is fitted to the taps of the dilution barrels and of the 100-gallon vat. The process of making 100 gallons of Bordeaux mixture is as follows: 8 gallons of the stock solution of milk of lime, and the same amount of copper sulphate stock solution (or 4 gallons only, if this has been made of the strength of 2 lb. of copper sulphate to the gallon of water) are carried up to the upper platform, and poured separately into the two dilution barrels, which are then filled with water up to the 50-gallon mark. The 50 gallons of milk of lime thus obtained in one of the barrels are stirred vigorously for a couple of minutes. A strainer is now placed over the vat, in such a position as to allow the hose from the taps of the dilution barrels to project into it. The taps of the dilution barrels are now turned on, and the contents of the barrel containing the lime being stirred continuously, the two 50-gallon barrels empty themselves through the strainer into the vat, filling it with 100 gallons of Bordeaux mixture. The whole process can be easily controlled by one man standing on the higher platform, as with his stirring-pole he can

reach the taps and so regulate the flow if necessary, and also stir and clear the strainer, should this become clogged. The Bordeaux mixture is immediately ready for use, and can be run off from the top of the vat into the spraying machine. Thus all the labour and waste of time in handling the mixture are saved; and given some such plant, and stock solutions, 100 gallons of Bordeaux mixture can be prepared in a few minutes at any time.

CLEAN NESTS.—One reason why Danish, French, and, in fact, all imported eggs realise such good prices is due to the fact that when the cases are opened the contents are not only well packed, but look well, in that the eggs are clean and fresh. Our home producers certainly fail in many respects in marketing, not among the least important being that a number of the eggs are either dirty or have been washed. In the latter case, the bloom that is so noticeable on a fresh egg is destroyed, and it instantly loses caste, being classed with those of a poorer quality. To overcome this difficulty all that is required is to see that the nests are kept clean, so that the shells of the eggs are not contaminated. The straw litter should be renewed whenever necessary, particularly in wet weather or if the nest becomes fouled.—B., in *Agriculture Gazette* (London).

ON THE PLANTING OF TREES.

Every one ought to plant as many trees as he possibly can. In the first place every one loves them. Then there is the shade from the sun, the wood for fire, the shade for grass, and fodder for cattle, and lastly the value of the timber. The ryot will not destroy the trees in his fields, but ploughs round them. This is perhaps a mistake, but it is no mistake to plant them carefully along the borders of the fields, along the lanes and roads and round about his house. Trees grow very easily in this country provided a little care is taken at the first. Collect good seed and sow it in a small well manured bed. When the plants are large enough to transplant, say about a foot high, dig a square hole about three feet each way and three feet deep, separating the surface soil from the harder subsoil into two heaps. If this hole is in stony land, a few headloads of heavy soil should be thrown in; but if the hole is in clay, a layer of stones may be put at the bottom. Then add equal parts of vegetable mould and surface soil and mix well together. Tread the whole down firmly and plant the tree taking care as usual to keep a ball of earth pressed round its roots when lifting it. Water it well and afterwards give it a chatti of water once a week.—(*Madras Agric. Calendar.*)

Figures for Farmers.

USEFUL FACTS, TABLES, AND FORMULÆ.

*** Under the above heading we intend publishing from time to time various figures, calculations, formulæ, tables, etc., likely to be useful to farmers at some time or other during the course of their operations. We can necessarily only publish a little each time, but we would advise farmers to cut these pages out and keep them for future reference; or, for the benefit of those who wish to keep their journals intact we may mention that each of these tables, etc., will be indexed separately, both monthly and half-yearly, and so will be easily found when required.*

ANALYSIS OF SEPARATED MILK.—Water, 90 per cent.; casein, 4 per cent.; fat, 0.1 per cent.; ash, 0.70 per cent.; sugar, 5.20 per cent.

WOOL WEIGHT.

7 lbs. avoirdupois	...	...	...	...	...	= 1 clove
14 lbs. or 2 cloves	...	...	...	...	...	= 1 stone
28 lbs. or 2 stones	...	...	...	...	...	= 1 tod
182 lbs. or 6½ tods	...	...	...	...	...	= 1 wey
364 lbs. or 2 weys	...	...	...	...	...	= 1 sack
4368 lbs. or 12 sacks	...	...	...	...	...	= 1 last.

20 lbs. = 1 score, and 240 lbs. or 12 scores = 1 pack.

Wool is frequently sold in Scotland by the stone of 24 lbs. Imperial.

RATES PER POUND, CWT., AND TON.

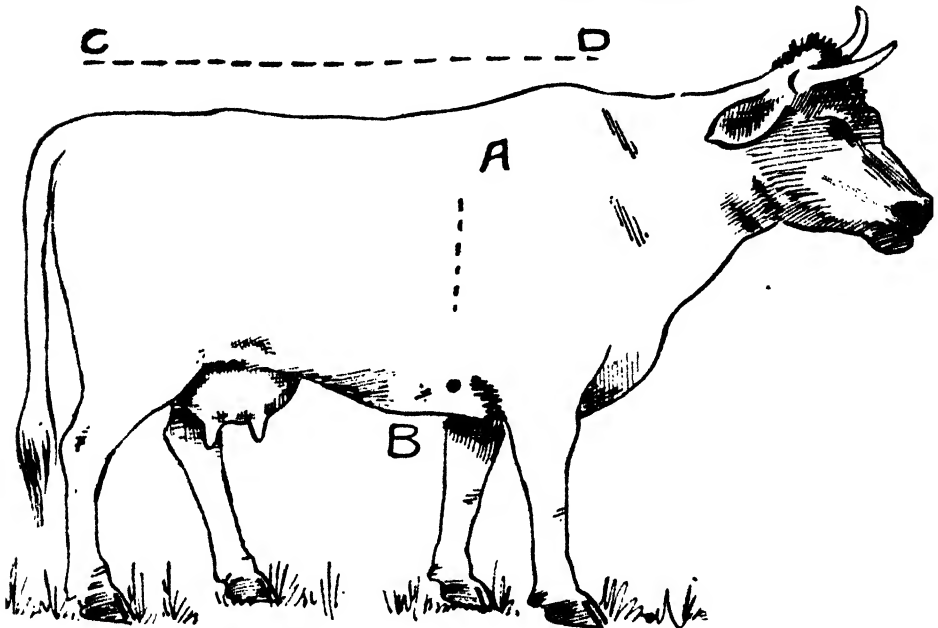
Table Showing Equivalent Rates per Lb., Cwt., and Ton.

Per lb.	Per cwt.	Per ton.	Per lb.	Per cwt.	Per ton.	Per lb.	Per cwt.	Per ton.
d.	s. d.	£ s. d.	d.	s. d.	£ s. d.	d.	s. d.	£ s. d.
½	2 4	2 6 8	4½	39 8	39 13 4	8½	77 0	77 0 0
¾	4 8	4 13 4	4¾	42 0	42 0 0	8¾	79 4	79 6 8
1	7 0	7 0 0	4¾	44 4	44 6 8	8¾	81 8	81 13 4
1¼	9 4	9 6 8	5	46 8	46 13 4	9	84 0	84 0 0
1½	11 8	11 13 4	5½	49 0	49 0 0	9½	86 4	86 6 8
1¾	14 0	14 0 0	5½	51 4	51 6 8	9½	88 8	88 13 4
2	16 4	16 6 8	5¾	53 8	53 13 4	9¾	91 0	91 0 0
2½	18 8	18 13 4	6	56 0	56 0 0	10	93 4	93 6 8
2¾	21 0	21 0 0	6½	58 4	58 6 8	10½	95 8	95 13 4
3	23 4	23 6 8	6½	60 8	60 13 4	10½	98 0	98 0 0
3½	25 8	25 13 4	6¾	63 0	63 0 0	10¾	100 4	100 6 8
3¾	28 0	28 0 0	7	65 4	65 6 8	11	102 8	102 13 4
4	30 4	30 6 8	7½	67 8	67 13 4	11½	105 0	105 0 0
4½	32 8	32 13 4	7½	70 0	70 0 0	11½	107 4	107 6 8
4¾	35 0	35 0 0	7¾	72 4	72 6 8	11¾	109 8	109 13 4
5	37 4	37 6 8	8	74 8	74 13 4	12	112 0	112 0 0

CATTLE WEIGHTS BY MEASUREMENT.

The *Manchester Weekly Times* gives the following method of ascertaining the weight of live cattle, as here illustrated:—

The method is to multiply the square of the girth by five times the length, and divide the product by 21, this giving the net weight of the animal in imperial stones of 14 lb. For example, suppose the girth of the



beast, at A B on the sketch, is 7 ft., and the length C D, 6 ft. The square of seven is 49, which multiplied by five times six, that is 30, gives 1470. Divide this by 21, and the result is 70—the approximate net weight of the animal in stones. This is taking an animal of average fatness. For very fat ones one-twentieth must be added, and with lean cattle one-twentieth deducted. Continuing this system of calculation, if the live weight is known, the dead, or net weight, of the four quarters can be ascertained by multiplying the live weight by decimal .605.

WEIGHTS OF POULTRY FEEDS.

1 quart of Middlings ...	...	...	...	weighs 1 lb.
1 " Shorts ...	...	...	...	" 1 lb.
1 " Bran ...	...	...	...	" 2 lb.
1 " Lucerne Meal ...	...	...	...	" 2 lb.
1 " Rolled Barley ...	...	...	...	" 1½ lbs.
1 " Wheat ...	...	...	...	" 2 lbs.
1 " Mealies ...	...	...	...	" 2

1	equal of Beef Scraps	...	...	...	weighs 1½ lbs.
1	" Beef or Blood Meal	...	...	...	" 1½ lbs.
1	" Oyster Shell Crushed...	...	...	...	" 3 lbs.
1	" Millet Seed	...	...	...	" 1½ lbs.
1	" Unshelled Oats	...	...	...	" 1 lb.
1	" Limestone Grit	...	...	...	" 3 lbs.
1	" Charcoal Crushed	...	...	...	" ½ lb.
1	" Kafir Corn...	...	...	...	" 1½ lbs.

TIMBER MEASURING.

To find the area of a board or plank.—RULE.—Multiply the length by the mean breadth of the area. NOTE.—When the board tapers, add the breadth of the two ends together, and take half the sum for the mean breadth.

To find the solid contents of squared timber.—RULE.—Multiply the mean breadth by the mean thickness, and the product by the length, for the contents.

To find the solidity of round, or unsquared timber.—RULE I.—Multiply the square of one-fourth of the mean circumference, or of the mean quarter girth, by the length, for the contents. RULE II.—Find the area corresponding to the mean quarter girth in inches in the following table, and multiply it by the length of the tree or piece of timber in feet, then will the product be the solidity in feet and decimal parts of a foot, according to Rule I.

Qr. girth	Area	Qr. girth	Area	Qr. girth	Area	Qr. girth	Area
in.	ft.	in.	ft.	in.	ft.	in.	ft.
6	.250	11½	.959	17	2.066	25½	4.516
6½	.271	12	1.000	17½	2.127	26	4.604
6¾	.293	12½	1.042	17¾	2.188	26½	4.877
6¾	.316	12¾	1.085	18	2.250	27	5.062
7	.340	12¾	1.129	18½	2.313	27½	5.252
7¼	.365	13	1.174	18½	2.377	28	5.444
7½	.391	13½	1.219	18¾	2.441	28½	5.641
7¾	.417	13¾	1.266	19	2.507	29	5.840
8	.444	13¾	1.313	19½	2.573	29½	6.043
8¼	.473	14	1.361	19½	2.641	30	6.250
8½	.502	14½	1.410	19¾	2.709	30½	6.460
8¾	.532	14¾	1.460	20	2.778	31	6.674
9	.562	14¾	1.511	20½	2.918	31½	6.891
9¼	.594	15	1.562	21	3.062	32	7.111
9½	.627	15½	1.615	21½	3.210	32½	7.335
9¾	.660	15¾	1.668	22	3.361	33	7.563
10	.694	15¾	1.723	22½	3.516	33½	7.793
10¼	.730	16	1.778	23	3.674	34	8.028
10½	.766	16½	1.834	23½	3.835	34½	8.266
10¾	.803	16¾	1.891	24	4	35	8.507
11	.840	16¾	1.948	24½	4.168	35½	8.752
11¼	.879	17	2.007	25	4.340	36	9
11½	.918						

—(Agricultural Chronicle.)

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

It is the practice of a large percentage of the most successful poultrymen to feed a part of the daily grain ration ground. Most of them feed the ground grain moistened with either milk or water, although some feed it dry. A fowl's gizzard is capable of grinding all kinds of grain, but it is generally considered to be more economical to have a part of the grinding done by steam or water power. The soft-feed idea, however, must not be overworked. A beginner often reasons that it is cheaper for the miller than for the fowl to grind the grain; but the powerful muscles of the gizzard are there to be used, and experience has shown that the balance of power of functions in the fowl's economy makes the vigorous exercise of the gizzard beneficial. When feeding moistened ground feed have it a comparatively dry, crumbly mash, and not a thin soup. Give what they will eat readily in 15 or 20 minutes.—G. ARTHUR BELL, *Assistant Husbandman, U.S. Bureau of Animal Husbandry.*

CONTINUOUS CROPPING.

When the same crop is repeatedly grown on the same field, there is liable to be a gathering strength from year to year of the insects and fungus pests which infect that crop. One of the most prominent illustrations of this is in the of potato-growing. The residue left in the land in the shape of haulm and tubers may be the means of continuing or even increasing the diseases from which this crop suffers. Thus, potatoes after potatoes are more liable to be diseased than when they are not grown for several years afterwards, and when they are taken on absolutely fresh ground the percentage of disease is still smaller.—PRIMROSE MCCONNELL.

GRUBS IN BEE-HIVES.

The only cure is to keep stocks strong and kill every grub or moth seen. The progress of the ravages of the wax-moth in weak stocks is simply amazing, and therefore we cannot be too vigilant in exterminating the moth and the grubs. Strong stocks keep out the wax-moth to a very great extent, and even if they get inside the hive they are not allowed to pursue their work in peace. It is said that Ligurians are deadly foes to the existence of the wax-moth in a beehive. They are extremely vigorous in dragging out the grubs, I know from experience, but it is also cer-

tain that little is seen of the ravages of the wax-moth in strong or populous beehives; therefore, keep all stocks strong.—Ivo (in *"Farm, Field and Fireside"*).

OVERSTOCKING SHEEP.

The most fatal mistake that can be made in sheep husbandry is overstocking, which is, unfortunately, but too commonly practised by Australian flock-masters. The prevailing idea seems to be that increasing the number of sheep on the land will lead to a consequent increase of profit. Unless some provision be made in the way of a store or fodder for the increased number, the inevitable result will be loss and disappointment. A half starved sheep cannot grow a strong, healthy fleece of wool, and even if a greater weight of clip be obtained from the larger number of sheep the price per lb. will show a considerable falling off, while the injury done by stunting the growth of the young stock will tell on the flock for many years. Overstocking will cause a more rapid degeneracy in the flock than any other kind of mismanagement.—GEORGE A. BROWN (*"Sheep Breeding in Australia"*).

FERTILISATION.

In the great majority of flowering plants the ovules are enclosed in an ovary. The pollen grains fall on the stigma and there germinate. The pollen-tubes find their way thence—down the inside of the style when one is present—into the ovary, and so the micropyles of the ovules. Seed does not form, nor, as a rule, does fruit ripen, till after this has taken place, and, when it does not occur, the ovary usually withers and the ovules shrivel up. Nevertheless, seedless fruits are known, as in the case of the banana, pineapple, and certain oranges, and it is quite possible that horticulturists may be able to establish stoneless cherries and plums, coreless apples and pears, blackberries and raspberries containing nothing but pulp, and large grapes as free from seeds as the small grapes which growers call "currants." But in all such instances the plant can be propagated only by cuttings.—W. FREEM. LL.D., (*"Elements of Agriculture."*)

"SCORCHING."

The passage of dissolved substances into the plant takes place by the purely physical process of osmosis, the walls of the root-hairs (which consist of single elongated cells) acting as semi-permeable membranes through which water or salts will pass independently, according to the relative concentration of the solutions inside or outside the cell. Should the cell sap be more concentrated than the soil water outside, pure water will pass through the wall until a certain osmotic pressure (causing

torgor in the plant) is reached, which varies with the concentration. If, on the contrary, the soil water becomes more concentrated than the cell sap, water will leave the cell, the plant will become flaccid, and even die if the withdrawal of water be too great. It is in this way that plants become "scorched" or "burnt" by too concentrated solutions of any kind of soluble salts, such as are formed when a little soluble manure, salt, etc., falls upon the surface of a leaf.—A. D. HALL (*"Fertilisers and Manures"*).

GARDEN MANURES.

In an ordinary way gardens require little artificial fertilisers, since they receive a superabundance of stable manure until the soil often becomes over rich in nitrogenous residues. Under such conditions the only fertiliser wanted will be some form of phosphatic manure, and this is very desirable to induce a properly balanced growth in the crops. Superphosphate may be used on the loams, basic slag on the strong soils, steamed bone flour and phosphatic guano when the soil is sand or gravel, and about $\frac{1}{4}$ lb. per square yard of one of these fertilisers should be dug in with the farmyard manure on those portions of the ground which come to be dunged in the usual rotation. . . . The compound garden manures sold under fancy prices should be avoided: though good fertilisers enough, their cost is excessive even considering the small parcels in which they are sold. Where stable manure is not available and a mixed fertiliser is required, nothing is better than a good Peruvian guano with 6 or 7 per cent. of nitrogen. In such circumstances the humus of the soil should be maintained by digging in as much organic matter—weeds, grass clippings, vegetable refuse, etc.—as possible.—A. D. HALL, M.A., F.R.S. (*"Fertilisers and Manures"*).

THE WATER TABLE.

Of the rain which falls upon the surface of the ground some flows on the surface of the rivers and is carried to the sea, while the rest soaks into the ground (except that which is evaporated). The amount which is taken up by the ground depends, other things being equal, upon the permeability of the materials which form the upper part of the land. We thus speak of rocks as being *pervious* or *impervious*, though these terms are used relatively, no rock being absolutely impervious to the passage of water. Clays are the principal rocks which are relatively impervious, while sands and limestones are underlying materials must eventually become *saturated* and the surplus water will then gradually soak away seaward or be restored to the atmosphere by evaporation: but when the ground is uneven, the rain which has been absorbed at a higher level may appear at the earth's surface again at a lower level in the form of springs. . . . As more and more water is added, the *saturated*

portion of rock will become more and more extensive, and at last the upper surface of this saturated rock will reach the ground, where springs will then be formed. The upper surface of this saturated portion will not be a plane surface parallel with the plane of stratification, but a curved surface rising from without inward, for the water escapes more rapidly from the parts adjoining the outflow than from parts which are more remote from it. Thus is the *curve of saturation* or *water-table* as it is sometimes termed.—J. E. MARR, M.A., F.R.S. (*"Agricultural Geology"*).

THE MOTHERLY SOW.

Serenity, undisturbed by fretful restlessness, are characteristics of a good brood sow. Any breeder of experience will know just what is meant when it is said that a sow is "motherly," but the exact meaning is difficult to set down in words. This material manifestation has an important bearing on success with a litter, and the dam's promise in this regard should have weight in her purchase. In making a selection the teats should be examined to discover that there are a dozen, well formed, not too small or obscure, and giving indications of supplying abundant milk.—F. D. COBURN (*"Swine in America"*).

Correspondence.

THE "BOSSIEKOP" MULE.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—Some time ago I was informed of the usefulness of the "Bossiekop" (Bushyhead) mule as a draught animal. It is a cross between the ordinary donkey mare and a pony stallion. I am informed that it possesses the hardihood of the donkey and the spirit of the horse. The latter quality makes it at once superior to the donkey, and I understand it is much faster and responds immediately to even the sound of a whip. As a rule the objection to the donkey is its tardiness, and if this cross will produce a more alert animal much will, I think, be gained. Breeding mules is an expensive undertaking, as the good quality horse mare one requires is hardly obtainable, and then only at a very high price. I shall be glad to know if any of your readers have had any experience in working the Bossiekop mule. It is, of course, highly important to know whether it shares the same partial immunity (after inoculation) with the mule against Horseshickness. On this point particularly I would like to be informed.—Yours, etc.,

ENQUIRER.

SOY BEANS.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—The enclosed cutting from *The Financier* of the 23rd July will probably be of considerable interest to your readers just now Soy Beans are all the rage.—Yours, etc.,

GEORGE CARTER & CO.

The following is a copy of the cutting referred to:—

"Reporting on the trade of Dairen, Mr. Acting Vice-Consul G. P. Paton says:—The export of beans in 1909 amounted to 462,000 tons, against 206,600 tons in 1908. Of the amount sent to Japan, probably some was re-shipped to Europe, while of the quantity sent to Europe about 90 per cent. went to the United Kingdom. Early in the year prices were low, viz., about £5 18s. per ton landed in the United Kingdom, but along with the increasing demand, the price rose towards the end of the year, and by December it was £1 5s. per ton higher than in January. There was also every indication that the figure would amount still higher, and, at the time of writing (early in 1910) beans are £2 per ton dearer than at the corresponding period of the previous year, a result probably brought about by a combination of causes.

"There has arisen a huge demand in Europe, probably owing its origin to the discovery of the seemingly endless number of ways in which the Manchurian bean and its products can be utilised in the industrial world. In the Orient, beans have long been used for making soy, miso, bean curd and also for lighting purposes, but the recognition in the United Kingdom of their value in the manufacture of soap, sauce, biscuits, paint, etc., is of very recent date.

"It is difficult to make a forecast of the future of the Manchurian bean, but there is little doubt that if, as seems probable, the French, German and United States Governments remove the duty on beans, then a great impetus will be given to the export. This may, of course, be counterbalanced by cultivation in other countries, but for a few years to come there will be a ready market for all that can be produced in Manchuria, and although in South Manchuria the land is already mostly under cultivation, there are still vast tracts in the north untouched by the farmers. The high prices prevailing this winter and the undoubted prosperity of the farmer are sure to lead to the opening up of fresh ground in the spring of 1910.

BEAN CAKE.

"The large crop of beans in 1908 had its effect on the price of bean cake, which was quoted at a much reduced figure in 1909, as compared with the previous year. The farmer in Japan has learned the value of bean-cake as a fertiliser for the paddy field and the mulberry plantation.

and immense quantities are exported to that country. In 1909, indeed, Japan took practically all (over 99 per cent.) of the bean-cake exported from Dairen. Towards the end of the year the export to Japan fell off considerably, and, although this is attributed in a measure to the decline in the purchasing power of the farmer in that country through the fall in the price of rice which followed on the record crop of last year, it is more than likely that the high price of bean-cake this year has forced him to find another fertiliser for his crops.

"A small quantity is exported to South China, where it is used both as a fertiliser and as a food for pigs. A shipment was also made last year to Formosa for trial in the sugar plantations, and, as the result was successful, the experiment will probably be repeated this year. Shipments to Europe have failed owing to the large percentage of moisture in the cake manufactured in Manchuria, which causes it to grow stale in the passage through the tropics.

"In the early part of last year all the mills were kept busy, and new factories were erected to meet the growing demand, but towards the end of the year the rise in the price of beans and the poor demand in Japan brought most of the mills to a standstill. Indeed, the outlook when the year closed was far from bright.

"In the absence of an official return by countries, the returns issued by the Harbour Office may prove interesting:—

		1908, tons.	1909 tons.
Japan	...	194,897	323,461
Korea	...	7	30
South China	...	6,063	1,198
North China	...	122	384
Europe	...	6	1,233
Total	...	201,095	326,306

BEAN OIL.

"In Manchuria, the primary object of the bean mills is the manufacture of bean-cake, and oil is only of secondary importance. The mills are all worked on the press system, and only extract 7 or 8 per cent. of the 17 or 18 per cent. of the oil contained in the bean. Consequently, in the absence of any demand for cake, there is no production of oil, unless under special contract. The oil manufactured by the large Japanese companies in Darien is all bought up by the principal Japanese exporters for shipment to the United Kingdom, the Continent and the United States, and the foreign merchant is obliged to purchase from the Chinese manufacturer, who will only make oil on receiving 80 per cent. of the price wherewith to buy the necessary beans.

"In the first half of last year, owing to the large manufacture of bean cake, there was a plentiful supply of oil, but with the rise in the

price of beans and the consequent poor demand for bean cake, oil rose to an exorbitant figure, and at the end of the year stood at £23 to £24 landed in the United Kingdom.

"The largest purchaser of bean oil is South China, which takes about one-half of the output. Of the remainder the bulk goes to Japan, where it is mostly transhipped to Europe and America."

THE MIDGET MOTOR.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

SIR,—With reference to the article in your June issue *re* "Midget" motors, we have the pleasure to inform you that we have now taken an option on the agency for these motors, and have already imported sample tractors with which we are at present carrying out a series of tests, with the assistance of an expert whom we arranged with the factory to send out to us. We enclose two photos of a recent test we made with a 30-h.p. motor tractor of Mr. Sanderson's manufacture. In one of these is shown the tractor at work drawing one of our "Columbia" 2-furrow ploughs, and in the other our new model "Colonial" 3-furrow plough.

We may say that this question of motor tractive power is one in which we are deeply interested as we feel that there is a great future before same in this country as soon as the manufactures have been modified to suit the peculiar conditions in this country, to which end development is rapidly progressing.

We have no doubt you will extend to us the courtesy of publishing this communication, and we beg to remain,—Yours, etc.,

G. NORTH & SON.

[We reproduce the two photographs referred to in the present issue.—Ed.]

HONEY EXHIBITS AT THE MARITZBURG SHOW.

TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

DEAR SIR.—On page 236 of your August number, the judges have given my exhibit of an observatory hive at the last Agricultural Show a somewhat caustic criticism, and I cannot let it pass without comment.

Firstly, the judges take exception to the fact that I placed empty sections in the super, and Mr. Pepworth rightly remarks that "no apiarist

would ever dream of using empty sections." Now, I put those empty sections in purposely for the Show so that the bees would have more room and air space as on two previous occasions I have lost the best part of my colonies, they having been overcome on account of the heat generated by the confined bees. I certainly could have filled the section with foundation, and will do so next year as this time I lost no bees.

Secondly, I do not think the judges should criticise so severely (especially in a new association) when the conditions are not definitely stated. There was no mention of an one frame or an uncomb hive. (Years ago Mr. Pepworth used to exhibit in a similar hive to mine.)

Lastly and most importantly, Mr. Pepworth states that no bee-keeper would think of using extracting frames and sections in the same super. Surely if Mr. Pepworth is serious in this remark, then he must have ceased to read up-to-date "bee literature," and I hasten to correct him in case he should give the lesser experienced a very wrong impression.

Mr. A. I. Root, in his *A B C and A Z of Bee Culture*, 1908 (3 years ago), page 111, remarks that Mr. Townsend reported excellent results by adopting the plan of using a super containing *both* extracting frames and sections (this has been since confirmed in "Bee Gleanings"). Mr. Root continues: "The super is equipped precisely the same as any other super for sections except that it has extracting-combs with closed-end frames on each outside. Where a super of this kind is placed on a hive the bees immediately occupy the drawn comb at the sides of the super and begin their storing. The comb being already drawn out it is a very inviting place in which the bees can begin storing. Having made a nice start in the two side extracting combs they work toward the centre—that is to say, they begin to draw out the full sheets of foundation in 4 x 5 sections next to the combs, and store in them. When work is once in full progress in the side sections of the super, the centre ones will take care of themselves, with the result that every section is finished about the same time, and of about equal fullness. When the super is completed, the two extracting-combs will be filled and capped as well as the section honey-boxes. The former can be extracted and used over again.

"It will be seen that the extracting-combs serve the purpose of excellent baits; and Mr. Townsend draws attention to the fact that, when such baits are placed at the *sides* instead of in the centre, they cause an even filling of the entire super; whereas by the old plan of putting bait combs in the middle of the super the storing begins around the baits, gradually working from the centre to the outside. This naturally brings about a better filling of the centre sections, leaving those toward the sides at a much later stage of comb-building and filling. The result of this is that the centre sections will be filled long in advance of the outside-

ones; and by the time these latter are filled, all the former will be travel-stained, and may induce swarming in the meantime.

"When Mr. Townsend first began this scheme of comb and extracted honey production from the same super, he had in mind only baiting the bees up into the sections; but he incidentally discovered that, inasmuch as the bees would enter such supers without hesitation, he thereby almost entirely overcame swarming.

"Comb-honey producers all know that the ordinary section-super placed on a hive is very often not entered readily by the bees. The series of little compartments (the sections) cause the bees to sulk, and before they actually enter the super they may swarm in disgust.

"It is well known also that, after bees are once started going above, their is less inclination on their part to swarm. Mr. Townsend finds that the two-side extracting-combs that he puts in every comb-super start the bees into the super about as readily as they would if containing extracting-combs only. The whole effect of this procedure is such that swarming is reduced to a minimum—almost brought under control.

"For the local markets, the side extraction-combs can be cut out and sold for chunk honey at about the same price as that in the sections; so that there need be practically no loss; or when there is a call for liquid honey it can be extracted.

"The Danzenbaker super, already described, with its 4 x 5 sections, is the best suited to carry out the Townsend plan."

Again, on page 112, under the title of "What to do when bees refuse to enter the sections," Mr. Root says: "At times bees will show a disposition to loaf and consequently a disinclination to go into the sections. . . . We will suppose you have a fair average season and some colonies are storing honey in the supers and others are not. Some bees are much slower in going above than others. If honey is coming in freely they can be baited usually by placing a partly filled section or two of the previous year in the centre of the super, or better give them a shallow extracting super, *a la* Barber, or, perhaps, *better still*, give them a super of sections and a pair of extracting-combs, as advised by Townsend."

The above, I trust, will tend to counteract the damage done by Mr. Pepworth, as, naturally, one does not expect such a glaring mistake from a judge.—Yours, etc.,

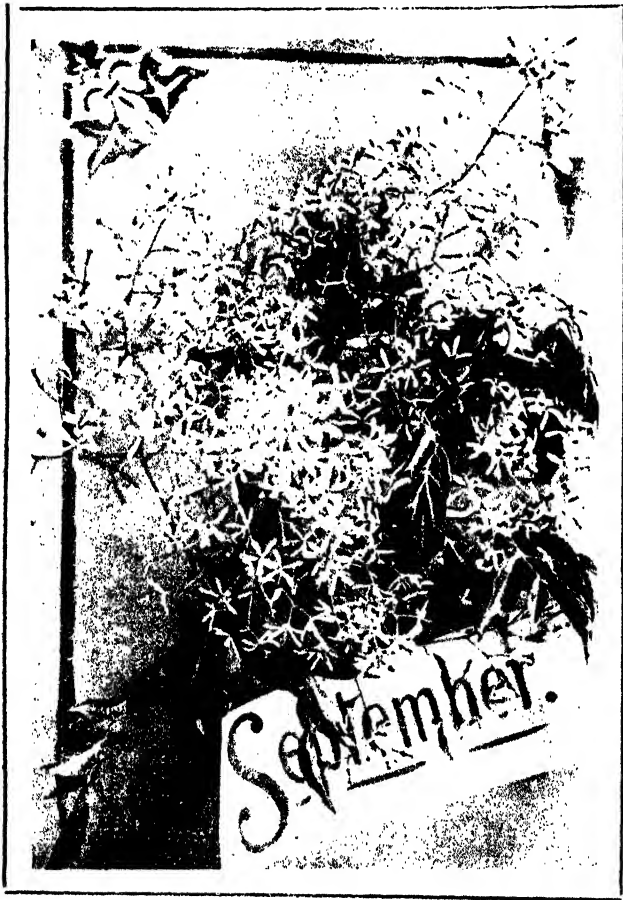
WALTER J. FULLER.

Jesmond Road,
Maritzburg.

THE FARMER BOYS' PAGES.

Conducted by "ARATOR."

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS



AND NATURE STUDY NOTES

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Nature Notes for September.

It is a Kafir saying that when the thorn trees are green the Spring is near. Each Mimosa becomes a forerunner, each Syringa bough a torch re-kindled by the sun. On the Peach trees there are green buds and fluffy ones--the "fluffy" ones open into delicate rose-pink blossoms, and the whole tree stretches rosy arms to the sun, while the green life comes hurrying up afterwards as though somehow it had overslept itself. The Mimosa has no sooner donned her new Spring robe than she loosens her golden tresses and fills the morning air with fragrance. Dark-eyed Syringa flowers appear among the laughing wind-tossed leaves. The wild Senna suggests Laburnum, the Syringa the Lilac of Home. In place of the Horse-Chestnut tree the Mauritius Thorn lights up her thousand lamps, while the Prickly Pear flowers catch the sunbeams in their golden cups.

In the early morning when only a few pencil streaks of light herald the dawn, when all is still, the hills mountains high, the trees large and shadowy, it is easy to believe a Dryad lurks in every tree. To the savage mind the bush is full of a vague dread--an undefined mystery of growth, and in the early morning we share this feeling--especially in the spring, the morning of the year, when the green life steals softly through the trees and the grey stems and bare brown branches blossom into twigs and leaves.

M. R.

Spring Studies.

Experience shows that the best time to begin a course of Nature Study is in the spring. Nature is then making a new beginning, and there is spring in the child's body and mind. The bush, the grassy veld, the bog, the shore-pools, are all "calling," and there are responses, whose origins are older than all books, in every healthy mind.

Spring is the fittest time to begin, when particularly interesting things, such as flowers and buds, may be studied in their appearance, when hundreds of wild flowers come up after the rain and the birds re-appear from the shelter of the kloofs.

Not with time-tables nor text-books does the naturalist begin, but with wandering deep into forest and high upon hill; in seeing, in feeling with hunter and with savage, with husbandman and gypsy, with poet and with child, the verdant surge of spring, foaming from every branch-let, bursting from every sod, breaking here on naked rock-face, there on rugged tree-hole, till even these are green with its clinging spray. Day after day he shall drift on the sea of Life as it deepens in verdure over

plain, as it eddies and ripples in blossom up the valleys, he shall keep unslaying watch upon the myriad creatures that teem upon its surface and crowd within its depth, till they show him the eager ways of their hunger, the fury and the terror of their struggle, the dim or joyous stirrings of their love.

All this quite seriously and definitely, is what we biologists want to teach him who would learn with us—say rather what we want him to see and hear, to live and feel for himself.—GEDDES AND THOMPSON.

The Principles of Manuring.

VI.—FARMYARD MANURE (*Continued*).

LAST month we commenced to study farmyard manure. We noticed this manure may be divided into three classes of constituents, namely, the solid portion, the liquid portion, and the straw or hay used as litter; and in our last article we studied the value of the first of these three classes. We now come to consider the 2nd class, comprising

THE LIQUID PORTION

of the manure.

Valuable as a solid portion of farmyard manure is, its value is not as great as that of the liquid portion. This fact will be better appreciated when it is realised that the solid excreta consist of undigested food substances, so that any fertilising matters which they may contain are really such as have not been absorbed into the animal system, whilst the urine contains the fertilising substances which have been digested. Urine will vary in composition, and so in fertilising value, in much the same way as the solid excrement, but with this difference at least, that urine is a waste product and in young animals there is more waste than in adults. The composition of urine will also vary to some extent according to the quantity of water drunk, since, of course, the more water the animal drinks the poorer must be the urine from a fertilising point of view; at the same time there is this fact to be borne in mind, namely, that the more dilute the urine is the larger will be its quantity, just as is the case with the dung. Stoeckhardt has found that the composition of urine will on an average be somewhat as follows for the different farm animals. It must be remembered, however, that the composition of urine varies according to different conditions, and the

analyses which follow are those of fairly representative samples given just to serve as a guide:—

	Water per cent.	Nitrogen per cent.	Phosphoric Acid per cent.	Alkalies, per cent.
Sheep (2 lb. hay per diem)	86.5	1.4	1.050	2.0
Swine (winter food) ..	97.5	0.3	1.25	0.2
Horses (hay and oats) ..	89.0	1.2	...	1.5
Cows (hay and potatoes)	92.0	0.8	...	1.4

It will be seen from the foregoing figures that there is very little phosphoric acid in the urine of farm animals; apparently pigs' urine contains it in the largest quantities, and even then the proportion is not as much as 0.2 per cent.

We thus see that the liquid excrement of farm animals does not constitute a complete manure, and, if it is applied separately from the solid excrement then it will have to be balanced by the addition of some phosphoric manure. But its incompleteness forms a strong argument in favour of applying the solid and liquid portion of farmyard manure in conjunction, if possible; and in this connection it should be mentioned that the drainings from the manure heap constitute a more complete fertilising agent than the urine itself as taken from the stalls or stables, as when the latter is poured over the manure heap first it takes with it, as it passes through, considerable quantities of phosphoric acid obtained from the solid portions of the manure. Basing his calculations on Stoeckhardt's figures, Professor Aikman gives the following as the average composition of the dry substances of urine of the common farm animals:—

	Nitrogen per cent.	Phosphoric Acid, per cent.	Alkalies, per cent.
Pig	12.0	5	8.0
Horse	10.9	trace	13.6
Sheep	10.4	3.7	14.9
Cow	10.0	trace	17.5

These figures show that the dry substance of the urine of the pig is richest in nitrogen and phosphoric acid, but poorest in alkalies; whilst that of the horse comes next as regards nitrogen, although in this respect there is very little difference between the horse, cow and sheep.

Having now considered the solid and liquid portions of farmyard manure, it will be interesting to consider their composition taken together. For the following remarks quoted below we are indebted to Professor Aikman* :—

	Water per cent.	Nitrogen per cent.	Calculated on dry substance, per cent.	Analyses by
Sheep	67	91	2.7	Jürgensen
Horse	76	65	2.7	Boussingault
Pig	82	61	3.4	"
Cow	86	36	2.6	"

* "Manures and the Principles of Manuring."

"From these figures we see that, in their natural condition, the excreta of the sheep are the most valuable; those of the horse and pig coming next: while those of the cow are poorest, containing one-third as much nitrogen as those of the sheep, and one-half as much as those of the horse and pig. This difference, however, is due almost entirely to the different percentages of water the excreta of the various animals contain in their natural state; for in the dry state they are seen to contain, with the exception of the pig, practically the same amount."

LITTER.

We now come to the third constituent of farmyard manure, namely, the litter, which usually consists of straw.

Litter is of value in four chief ways. In the first place it adds to the value of the manure, chemically and physically; secondly, it serves to absorb and retain to some extent the liquid portion of the manure; thirdly, it increases the quantity of the manure and thus effects a more equal distribution, and in the fourth place it retards the decomposition of the manure. The only point which we intend considering here is the first, namely, the increase in fertilising value which litter gives to farmyard manure, and in doing so we have to study the composition of the material which is used as litter. Straw is, as we have said above, generally used as litter in stables and stalls. Straw contains not more than about 0.5 per cent. of nitrogen. The percentage of nitrogen in wheat straw varies from 0.22 to 0.81; in the case of barley straw from 0.41 to 0.85; and in the case of oat straw from 0.32 to 1.12. Straw does not contain any considerable percentage of phosphates, but of other mineral matter it contains considerable quantities, the percentage being usually somewhere about 5 per cent. Potash forms the largest proportion. Dry leaves have also been used as litter, but they contain only a very small percentage of fertilising matter. They do not form good litter as they ferment very slowly.

(To be continued.)

Sitting hens and their nests should be sprinkled with insect powder to keep the vermin from breeding. If insects are allowed to collect on the chickens their growth will be retarded, and it takes them a long time to get over it, and so weakens them that they often breed worms, and we are of opinion that in many cases extreme weakness caused by the vermin is the reason for worms.

Fruit Culture.

SOME CHATS FOR BEGINNERS.—V.

By "POLUS."

WE now come to the last of the four methods of propagating trees other than by planting seeds, namely, the method of grafting.

The main and essential difference between grafting and propagation by cuttings lies in the fact that whereas the cutting develops roots of its own and extracts its nourishment through them direct from the soil, the graft does not develop roots but obtains its sap from the stalk (or tree) upon which it is made to grow. In grafting, the two chief requisites for success are (1) that the graft be set in the stalk in such way that the sap may flow upward without any interruption, and (2) that the forming wood may extend downwards through the bark also without interruption. Mr. John J. Thomas in his book, "The American Fruit Culturist," lays down certain essentials which must be observed if the above two requisites are to be effected, and as they are expressed so concisely I think it will be well to reproduce them here. They are as follows:—

(1) That the operation be performed with a sharp knife or grafting chisel, that the vessels and pores may be cut smoothly and evenly, and the two parts brought into immediate and even contact;

(2) That the operation be so contrived that a permanent and considerable pressure be applied to keep all parts of these cut faces closely together;

(3) That the line of division between the inner bark and the wood coincide or exactly correspond in each; for if the inner bark of the one sets wholly on the wood of the other, the upward current through the wood and back through the bark is broken, and the graft cannot flourish or grow;

(4) That the wounded parts made by the operation be effectually excluded from the external air, chiefly to retain a due quantity of moisture in the parts, but also to exclude the wet, until, by the growth of the graft, the union is effected.

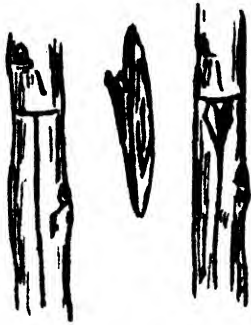
I need only refer here to the fourth of these essentials, as the other three explain themselves. In order to exclude the air from the wounded parts when the operation is finished, plasters of grafting wax or grafting clay may be used. Grafting wax can be made of rosin, beeswax and tallow, by mixing together 3 parts each of the rosin and beeswax and two parts of the tallow; or a cheaper composition may be made of the same materials but in different proportion, namely, 4 parts of rosin, 2 of tallow, and one of beeswax. Whichever formula is used the ingredients are first melted and then mixed together. There are various ways in which the grafting wax is used. One way is to warm it just sufficiently to make it run and then apply it directly to the wound with a brush. Another way is to paint it thickly with a brush over sheets of muslin: these are later (a cold day being chosen for the purpose) cut up into strips of convenient size and wrapped around the wound. The main point to be borne in mind, however, whichever way the wax is applied, is that the wax should be pressed into every part so as to fill all the interstices.

Grafts may be cut at any time between the cessation of growth in autumn and the commencement of the growth in spring. Shoots of one summer growth should be chosen. If there are any leaves on them they should be cut off.

The two commonest methods of grafting fruit trees are those known respectively as whip or tongue grafting and cleft grafting. The accompanying sketches (Fig. 4) will illustrate better than words how whip grafting is done. If the graft should be smaller in diameter than the stock it must be placed at one side so that the line of separation between the bark and wood may coincide. In such cases the other side of the stock is cut away so as to bring it to somewhere near the same size as the graft in order to facilitate wrapping. Cleft grafting assists in cutting off the stock flat, splitting it down for a little distance and then inserting the sharpened end of the graft. The accompanying figures (Fig. 6) illustrate how this is done. In this method of grafting care must be taken to have the line of separation between the bark and wood coinciding on at least one side of the union. In saddle grafting (Fig. 5) the stock is sloped off on each side; the lower end of the graft is split up for a little distance with a sharp knife and the sides of the cut pared so as to leave an inverted V-shaped opening; the graft is then slipped on to the sharpened stock and the whole bound tightly together.

Grafting is sometimes done with roots. In this case the ship-grafting method is followed.

(To be continued.)



1.—The bud and how it is inserted.



2.—The bud in position and bound-up.



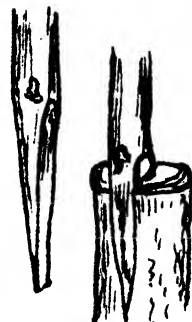
3.—Ring-budding



4.—Whip-Grafting.



5.—Saddle-Grafting.



6.—Cleft-Grafting.

BUDDING AND GRAFTING.

Agricultural Chemistry for Beginners.

By ARCHIBALD PEARCE.

CHAPTER XI.

SOILS.

THE soil has been well said to be the raw material from which the farmer manufactures the various products of his farm, although the actual process of manufacture is taken out of his hands by the operations of nature. It is his province to assist nature by every means in his power, and to take care that nothing shall hinder her free action so far as he can prevent it. It is therefore important for him to study the various kinds of raw material at his command, and to learn their peculiarities, in order to be able to fulfil his duties in that direction with skill and judgment. In relation to the growth of plants the soil has two duties to fulfil, first, to furnish a supply of plant food; and, secondly, to act as a support for the plant and a holding-ground for its roots. The present chapter will deal chiefly with the first of these functions.

As is to be expected, there are both organic and inorganic substances in soils. The former consists of the remains of plants in a more or less decayed condition, and the general term of *humus* is applied to this portion. The inorganic part is divided into sand, lime, and clay, with the small proportion of mineral salts that give to a soil its power of supporting plant life. The characteristics of a soil depend on the proportion in which these ingredients exist; and soils are divided into classes to indicate roughly their composition. Thus a soil chiefly consisting of clay is called a clay or argillaceous soil; a mixture of sand and clay is known as a loam; and when the sand is the chief constituent, the soil is said to be sandy. All these may contain more or less lime and humus, and so differ in their fertility. If the humus forms the largest part of the soil, it is called a vegetable or peaty soil, while if as much as 20 per cent. of carbonate of lime is present it is a calcareous or lime soil.

It is not very difficult to make a rough analysis to determine the amounts of clay and sand in any soil. If a small quantity, say two ounces, is carefully dried and weighed, placed in water in a dish, and thoroughly stirred and broken up, we shall find that the sand settles quickly to the bottom, while the clay, being lighter, remains floating for a longer time. The clayey liquid is then poured carefully off into another vessel, and the remaining sand washed once or twice with small quantities of water, the washings being added to the liquid containing the clay. In this way the clay and sand are fairly separated. After complete

settling the water is carefully poured off from each vessel, and the two sediments dried and weighed. The weight of the first gives the quantity of sand present in the two ounces of soil, the second that of clay. The proportion of humus is ascertained by burning a known weight of the soil in an iron vessel at a red heat of an hour and weighing the residue; the loss of weight represents the organic substances.

If we treat a soil with water or very weak acid, we shall usually find that only a very small proportion of it dissolves; and yet it is in this soluble portion that the whole of the plant-food obtainable is contained. It is quite common for a considerable quantity of compounds composed of elements suitable for plant-food to be present, but in such an insoluble state as to be quite useless for immediate purposes. Such plant-food is said to be *dormant*. One of the reasons why thorough tillage and breaking up of the soil is insisted on is that every part of the soil is exposed to the air, the sun, the frost, and other agencies that can effect a chemical change. In this way a well-cultivated soil gradually has its dormant plant-food converted into more soluble and available forms. A good example of this process has been already mentioned in an earlier chapter, when it was pointed out that the nitrogenous constituents of humus are unavailable for the use of plants until converted into nitrates in the way there described. The nature of the soil itself largely affects the rapidity of this conversion of dormant into active plant-food; the distinction between clay and sand is that the particles of the former are infinitely smaller than those of the latter; in consequence there is much more surface to be acted on, whence clays and loams, apart from other causes, generally respond more readily to tillage, and are said to more kindly.

The quantity of humus contained in a soil has a great influence on its fertility, and the more nitrogen it contains the more valuable it is. Since it consists of the remains of plants it is only natural to expect that it will furnish just those elements which are requisite for the growth of other plants; moreover, the decay of vegetable matter in the soil aids the change of dormant inorganic substances into the soluble condition, largely due to the carbonic acid given off during decay. Certain organic acids are also formed at the same time, and these combine with lime, potash, and ammonia, and other bases that may be present, and these organic salts are very valuable sources of plant-food. If the quantity of decaying matter is too large, the acids cannot find enough bases to satisfy them, and in this state the soil becomes acid or sour. As a general rule efforts should be made to keep up the supply of humus by all available means, and this applies most of all to sandy soils. The methods in common use for this purpose are the application of farmyard manure, and the ploughing under of green stuff, whether weeds or a crop planted specially.

THE SOIL IN RELATION TO WATER.

In order that a crop may flourish at its best, it is necessary that throughout the whole period of its life it should be within reach of ample supplies of water; at the same time it must not have its roots immersed, or the air cannot reach them, and they have a tendency to rot. The natural means by which the land obtains its water are the rainfall and the absorption of moisture from the air. Neither the rain nor the quantity of atmospheric moisture can be artificially regulated, but we can at least see that the best use is made of the supply that nature provides. All soils do not behave alike with regard to water, and here, again, the difference in the size of the soil-particles come into play. A sandy soil allows the rain to soak through it quickly, and has little power of absorbing atmospheric moisture, or of drawing up the water from below by the action of capillarity. This is the name given to the power which enables the tiny gaps between the particles of a porous substance to suck up a liquid, just as a lump of sugar or a piece of blotting-paper does. Such soils feel the effect of drought very quickly. A clay soil, with its fine particles, is apt to be impervious or watertight, and the ground becomes waterlogged in a heavy rainfall; soils of this kind become caked, and are troublesome unless drained. A soil rich in humus is little afflicted by either of these evils, and this suggests that both sands and heavy clays may be improved by increasing the amount of humus they possess. This keeps the sand soil from drying out so soon, and aids it to absorb moisture from the air. The clay is assisted by having its pores opened and its caking checked.

The rise of water by capillary attraction depends on the fact that the tiny spaces between the soil-particles act as tubes, and draw up the moisture from below. This may assist the crop for a time, but when the moisture reaches the surface it is dried up by evaporation, and the continual repetition of the process results in a great loss of soil water, which may become serious in a dry season. If the soil-grains are large, as in coarse sands, the capillary rise of water is feeble; when they are fine, as in clays and vegetable soils, the process is at its best. If the soil is reduced to a broken and crumbly state, as by ploughing and scuffling, this rise of water is checked at the surface. For this reason soils which have been well tilled and broken up are enabled to remain moist far longer than when packed hard and close; and it is easy to see why the continual breaking-up of the crust in a cultivated soil gives it a much better chance of standing drought.

The power of retaining moisture also means to a large extent the power of retaining the soluble forms of plant-food. Thus it is safe to put rotted farmyard manure on a clay or loam soil, for the substances already rendered soluble by decay remain near the surface and within

reach of the roots. On a sandy soil, however, the soluble salts would soon be washed out, so that it is preferable to apply the manure in a fresh condition, in order that as fast as the fertilising portions are rendered soluble they may be taken up by the crop.

The ideal behaviour of a soil towards water may be summed up as follows:—

1. It must allow rain to percolate through it with comparative ease. This condition is best fulfilled by sands, and deeply cultivated and well-drained loams.

2. It must be able to hold a considerable proportion of water while apparently dry. Clay may contain as much as 50 per cent. of water without seeming very wet, while sand will hold perhaps only 5 per cent. Humus also possesses this property in a high degree.

3. It should readily absorb moisture from the air. Humus again is favourable to this condition, clay somewhat less so, while sands have but little power in this direction.

4. It should be capable of allowing the capillary rise of water. This requirement also is best satisfied by clay and humus.

5. It should not allow of being easily dried out by exaporation. For this purpose the upper layer of soil must be in a fine and powdery condition.

The study of the various characteristics of different soils shows that a pure sand or pure clay soil is not the most desirable, but that a mixture of soil constituents is better; that a sandy soil is generally the most difficult to manage satisfactorily and that a loamy soil, with a fair admixture of humus, is the most ready to respond to our efforts to cultivate it, and least likely to suffer from the vicissitudes to which it may be exposed. These theoretical conclusions fully agree with the results of practical experience.

Notes on Irrigation.

THE USE AND ABUSE OF WATER FOR PLANTS.

By C. A. BARBER,
Government Botanist, Madras.

EVERY one knows that plants require water at their roots. Even the wild plants growing in dry, almost rainless tracts need it, and they are only able to live because they have the power of sending their roots very deep down into the ground in search of it. Where water is scarce the growth of plants is meagre and slow and if, after being well supplied for a time,

the water is cut off, they wilt and lose their shape and, unless quickly relieved, are in danger of death. In a cultivated crop the plants produce their flowers and fruits before the time. The yield under such circumstances will be small indeed and the grain will be empty and worthless.

Water is of use to the plant in many different ways. In the first place it is a necessary food. Animals as you know need water as a drink, but plants need it much more. Much of the plant's substance is made up of water and, with an insufficient supply, the tissues become hard and woody. Plants can only take up their food in the liquid form. Water coming out of the ground into the roots always has mineral matters dissolved in it. And this is the food which the plant needs for its growth. It is also necessary that the food solution should be exceedingly dilute. And thus a very large quantity of water is constantly passing up the stem to the leaves, where it is given off in the form of vapour. Lastly, water is necessary for the plant to keep its proper shape. If there is not plenty of water, it becomes limp and hangs over, and in order that it may spread out its leaves to the sun, its tissues must be tense and stiff with water. Its branches must spread out and its flowers must be fully expanded in order that it may bear its fruits and ripen them. Otherwise the crop will be a failure.

Now of all the sources from which the plants gets water the rain is the best. In countries where rain falls more or less all through the year, perhaps a good shower once or twice a month, there are no tanks, no irrigation channels and no big wells. Such, for instance, are the West Indian Islands. . . . Where, however, the rain, although great in quantity, falls more or less at one season of the year, and there is practically none for long periods, irrigation becomes a necessity for a crop to be grown at all. The water is diverted for long distances from the great rivers, the surface wash is carefully collected and stored in large tanks, and deep wells are dug to get the subsoil water.

But irrigation has its disadvantages. It is not to be compared with the silent rain coming out of the skies. In the first place plants, like animals, need a thorough wash now and then. Otherwise their leaves get clogged with dust and they cannot breathe, and insect pests multiply till they endanger the life of the plant. Insects can never make much headway if the plants are properly washed by the rain. In the second place there is always danger of over-watering. The ryots of India have not learnt really how little water will suffice for the production of a good crop, even of paddy. The cultivators in India, knowing that water is a good thing and necessary for the production of a good crop, have apparently come to the conclusion that the more of it they give the larger the crop they will reap. But this is very far from being the case. If

too much water is given the air is driven out of the soil and the ground becomes water-logged. Hence arise numerous diseases, chiefly of a fungoid nature. Most of the diseases of sugar-cane in the Madras Presidency, for instance, are caused by giving too much water in irrigation. It is nearly as important to take the water off the land as to put it on. Proper drainage must always go hand in hand with irrigation. And any place which lies too low for the water to flow off readily must be irrigated with the greatest care.

Lastly, the most important disadvantage of irrigation lies in the dreaded *soudu* or salt land. When land is irrigated for many years it frequently becomes full of harmful salts so as to be absolutely valueless for growing crops. Where alkali is formed plants will not grow at all. Alkali land can be in great part avoided by careful attention to drainage, but if this be neglected it will take many years before the ground can be got into good condition again.

These facts should be thought about by all who use wells for garden irrigation and by all cultivators of wet lands.

Poultry Notes.

THE best breeds for marshy soil are Rhode Island Reds, buff Plymouth Rocks, and Indian Runner ducks.

Day-old chicks may be placed under a broody hen at night after it has been sitting for about a week.

Most of the chicken ailments complained of have been the result of allowing the young birds to remain on the same ground too long. All coops should be moved at least every other day.

Scaly legs are associated with uncleanness and overcrowded runs, and the unsightly enlargement can be cured by dipping the legs in crude paraffin, and afterwards anointing with sulphur ointment.

The simplest cure for broody hens not required is to place them in a box with a framework (strips of wood) which, if supported by four bricks, will allow a current of air to pass, and thus soon relieve the birds' broodiness, while Epsom salts in the drinking water is beneficial.

Feather picking is the result of too much food and too little exercise, and may be remedied by decreasing the quantity and quality of the meals of grain given, burying the latter in loose litter to promote exercise, whilst tincture of quassia chips smeared on the quills of the remaining feathers will prevent further trouble.

Hen Tens.

TEN hens in a house ten by ten feet are enough.

The yard should be at least ten times as large as the floor of the house.

Ten weeks from shell to the market is the time allotted to a chick.

Ten months of the year is usually the highest limit of time during which a hen will lay.

Ten hens with one male is about the proportion.

Ten pounds is a good weight for males of the larger breed, one year old.

Ten eggs is the average number to each pound.

Ten flocks, each consisting of ten hens, are enough for the acre.

Ten chicks, when just hatched, weigh about one pound.

Ten hens should lay about one thousand eggs during the year. This allows for some laying more than one hundred eggs each.—(*Agricultural Gazette*, London).

Pigs for Small Farmers

THERE is one advantage about pigs which makes them perhaps the best live stock for the poor man or the small farmer, and that is the very quick returns which they afford by the rapidity with which they increase and come to maturity.

A well-treated sow will farrow two litters of pigs a year, that will easily run from seven to eight pigs in each litter; and if proper feed and care are given, these may be ready for market almost at any time. No other stock kept on the farm will make so good a return in so short a time.

Another advantage with pigs is that they are marketable from the time they are farrowed until they are fattened. A sow with a litter of pigs and growing pigs, three, four or five months old, will always sell at full market prices; so that the farmer is not obliged to feed them to maturity to get a little money out of them.

With a little management pigs may be fattened to sell when it is possible to secure the best gain at the lowest cost; and when it is considered that they utilise much on the farm that would otherwise go to waste, it is only in exceptional cases that a few cannot be kept with profit.—(*Agricultural Gazette*, London).

Sheep Dips.

SOME LEADING PRESCRIPTIONS.

THE following prescriptions for sheep dips have been approved by the British Board of Agriculture and Fisheries for sheep scab, and can be used by sheep owners who prefer to make up their own dips.

(1) *Lime and Sulphur*.—Mix 25 lbs. of flowers of sulphur with 12½ lbs. of good quick-lime. Pound or rub the mixture with water until a smooth cream without lumps is obtained. Transfer this to a boiler capable of boiling 20 gallons; add to the mixture sufficient water to make up 20 gallons; boil and stir for half an hour. The liquid should then be of a dark red colour; if yellowish, continue the boiling until the dark red colour is obtained, keeping the amount of liquid up to 20 gallons by adding water if necessary. Half the above quantities may be used to make 10 gallons, if more convenient. After the liquid has cooled, pour it off from any small quantity of insoluble sediment. To 20 gallons of the mixture add 80 gallons of water to make a bath. The mixture will keep good for twenty-four hours if kept in a covered vessel, and for a month or even more if kept in jars or drums securely corked. Period of immersion for sheep in this dip, not less than half a minute.

(2) *Carbolic Acid and Soft Soap*.—Dissolve 5 lbs. of good soft soap, with gentle warming, in 3 quarts of liquid carbolic acid (containing not less than 97 per cent. of real tar acid). Mix the liquid with enough water to make 100 gallons for the bath. This mixture after being prepared will keep good for three months if kept in securely stoppered jars or drums in a cool place. Period of immersion for sheep in this dip, not less than half a minute.

(3) *Tobacco and Sulphur*.—Steep 35 lbs. of finely ground tobacco (known as offal tobacco) in 21 gallons of water for four days. Strain off the liquid and remove the last portions of the extract by pressing the remaining tobacco. Mix the whole extract and add to it 10 lbs. of flowers of sulphur. Stir the mixture well, to secure its being evenly mixed, and add sufficient water to make up 100 gallons for the bath. This mixture will not keep. Period of immersion for sheep in this dip, not less than half a minute.

In every case the dip bath should be of sufficient volume to allow of each sheep being completely immersed in the bath. Where a number of sheep are to be dipped the bath must be cleaned out from time to time, otherwise the efficacy of the dipping may be impaired.

Horse Notes.

THE very best horses will never bring their actual worth in any market unless they are in good flesh.

With horses size with good action are desirable qualities. Feeding colts liberally means larger and stronger mature horses.

Aside from brushing off the dirt and loose hairs, good grooming opens the pores, softens the skin, and produces a sleek, strong coat.

A good growth the first year of the life of a colt costs less than at any other age.

The growing period, when the animal is young, is the time that the frame is built.

A little care in good season will make a great deal of difference in the value of a colt when grown up.

Unsoundness and weakness of points and muscles are usually the result when growing colts are kept tied in stalls without daily exercise.

A colt that is weaned without a setback, and is carried through its first winter with a liberal ration of oats and bran is half made.

Hints for Butter-makers.

THE *Agricultural Gazette* (London) publishes the following useful "Hints for Butter-Makers":—

The thermometer is about as indispensable to the up-to-date butter-maker as the scales are to the merchant. Have a good one.

Before attempting to churn, be sure and ripen the cream properly. Do not mix any fresh cream with that which is intended for churning within at least twelve hours before churning. Don't forget that sweet and sour cream does not churn alike, and if mixed just at churning time the butter contained in the sweet cream would go out in the buttermilk when the sour cream portion would be finished churning. Don't fail to stir the cream gently at intervals while ripening, so that it will all ripen uniformly.

Don't forget that the temperature of the cream at churning should be 56 to 58 degrees Fah. in summer, and 60 to 62 degrees in winter. The best churning results will be had at these respective temperatures.

Scald the churn, butter-worker and all wooden utensils with boiling water before and after using them, and thoroughly cool them with cold water. Always use a brush to scrub with.

Don't churn the butter past the granular stage. Use every means to preserve the grain of the butter.

Wash the butter just enough to get all the buttermilk out of it; that is sufficient.

Always salt the butter as soon as it has thoroughly drained after washing, and set it away in a cool place for at least four or five hours to allow the salt to thoroughly dissolve, after which work it just enough to make the colour uniform. The best butter is made where the least working is done. Never use more than one ounce of salt per pound of butter, unless by special order from a customer. Study the requirements of your customers in this. Always use the best brand of salt.

Give good weight in packing or printing. It is better to give a pound than to have a pound short.

Always pack butter with a view to tidiness in the very highest degree. No matter what form of package is used, specially study the requirements of the markets for packages.

Always market your butter regularly at current market prices. Give your customers pure, sweet, fresh butter, and your reputation as a good buttermaker will soon be established. When your butter is held until it is old and stale, it is not wanted, and your reputation suffers as well as your pocket.

Practice cleanliness in every detail. Good butter cannot be made unless cleanliness is the watchword.

Soft Cheese Making.

A GOOD USE FOR SURPLUS MILK.

A VERY good method of disposing of surplus milk, where such cannot be sent to a dairy, is the manufacture of small soft cheeses. The prices obtained for these are generally satisfactory, and the outlay for produce in them is very small. The ordinary farmer or dairyman would be well advised to restrict himself to one kind of cheese, and thereby gain experience which will lead to greater efficiency than would be the case in attempting too much. A writer in *The Dairy* on the subject of soft cheese making, contributes a brief but useful description of the manufacture of one of the commonest of British soft cheeses, viz., the Cambridge, or York as it is sometimes called. (It may here be remarked that the British types of cheese are easier to produce than the Continental varieties, and will be found turn out more satisfactory. Fresh whole milk is taken and heated to a temperature of 95 degs. F., and rennet added at the rate of 1 cc. to each gallon of milk. Mix in the rennet by stirring with a wooden hand for a few minutes, but be careful not to overstir, and a fall in the temperature of the milk during coagulation must be avoided. When a curd has formed which breaks cleanly over the finger it can be ladled into the moulds, which are made in two parts, the bottom portion holding the straws, on to which the curd is ladled. The curd is cut in

thin slices when filled in the mould. Drainage takes place very rapidly, and in 24 hours the curd will have sunk to about one-third its original volume, and in 24 to 48 hours more, according to the temperature, it will have shrunk in the mould still more, and finished draining. The cheese does not require to be turned or salted, and is consumed while in a fresh state. The knack of producing a fine Cambridge cheese consists in getting the drainage to take place quickly, and this may be helped by avoiding draught and keeping the room warm, or adding a few drops of starter to the milk prior to adding the rennet.

HOW TO MAKE CREAM CHEESE.

Cream cheese is the easiest of the soft descriptions to make, requiring comparatively little attention and labour. To make it, cream of a fairly thick consistency at a temperature of about 60 degs. to 65 degs. is placed in a fine-textured linen cloth, tied up in pudding fashion, and hung to drain in a cool, draughty place. Not more than one gallon of cream should be placed in the same cloth. Twice daily or so the cloths are opened out and the cream scraped down from the sides of the cloth. It is a good plan to change the cloth for a fresh one two or three times during the draining process. Drainage takes about two days, and can be assisted by placing on the cloth containing the cream a board with a small weight on top. When the cream is of a firm pasty consistency it can have a small amount of salt added, and is then ready for moulding. These cream cheeses are generally made in two sizes—the 4 oz. size, which sells at 6d., and the 2-oz. size, which sells for 3d. About 25 to 30 of the 4-oz. size cheeses can be produced from one gallon of cream, the number depending on the richness of the cream or the number of gallons of milk from which it was obtained, the richer the cream the greater being the quantity produced.

The soft cheese industry is often regarded merely as a nice subject for dairy teachers to discuss, and it is considered as something of a pastime to be able to make these dainties. It is not often looked upon seriously as a money-making occupation. In view, however, of the satisfactory prices obtainable for soft cheeses, milk producers would be well advised to consider the desirability of manufacturing at least their surplus milk into one of the varieties named, and, as a demand is built up, to increase the output.

** * Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.o. Editor, "Natal Agricultural Journal," Maritzburg.*

Meteorological Returns.*Meteorological Observations taken at the Govt. Stations for the Month of July, 1910.*

STATIONS	TEMPERATURE (Fahr. Deg.)				RAINFALL (In Inches)						
	Means for Month		Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day.		Total for Year from July 1 1910	Total for same period from July 1 1909	
	Maximum	Minimum					Fall	Day			
Observatory	73.7	51.3	83	49	39	5	16	2nd	39	1.81	
Stanger	70.1	52.4	84	46	—	—	—	—	—	1.31	
Verulam	76.3	46.9	86	40	17	3	11	8th	17	1.61	
Umbogintwini	75.8	48.5	91	40	74	4	62	3rd	71	1.98	
Winkle Spruit	70.2	52.2	87	48	98	1	98	2nd	98	1.77	
Port Shepstone	73.8	52.6	84	48	140	4	85	2nd	140	1.20	
Imbizana	75.2	51.1	84	46	88	5	67	2nd	88	1.17	
Umzinto	77.5	43.8	93	37	63	4	35	2nd	63	1.39	
Mid-Illovo	71.8	50.0	80	41	37	2	36	8th	37	1.12	
Bulwer	62.3	31.5	76	22	97	2	96	7th	97	.61	
Richmond	71.0	42.5	87	35	33	1	33	7th	33	.71	
Krantzkloof	73.1	51.2	81	46	95	2	93	1st	95	1.07	
Maritzburg	73.7	41.1	88	31	96	1	96	7th	96	.82	
Cedara	68.8	29.8	84	21	96	1	96	8th	96	—	
Howick	69.2	37.8	82	26	23	1	23	7th	23	.62	
New Hanover	75.2	40.2	85	29	20	1	20	7th	20	.78	
Krantzkop	70.7	35.7	80	29	—	—	—	—	—	—	
Greytown	69.2	39.7	82	24	95	1	95	2nd	95	.73	
Lidgerton	72.9	29.0	88	17	11	1	11	7th	11	.54	
Nottingham Road	66.6	24.6	80	12	80	2	50	7th	80	.41	
Estcourt	68.8	33.5	81	25	—	—	—	—	—	.31	
Weenen	79.1	32.2	87	24	—	—	—	—	—	.36	
Ladysmith	72.2	35.3	82	25	—	—	—	—	—	.56	
Dundee	70.3	40.2	79	32	—	—	—	—	—	1.04	
Newcastle	74.0	19.9	79	10	—	—	—	—	—	.80	
Charlestown	65.0	30.8	73	15	—	—	—	—	—	1.04	
Utrecht	72.9	30.6	76	27	—	—	—	—	—	.71	
Vryheid	69.6	42.9	84	33	—	—	—	—	—	.74	
Paulpietersburg	74.4	33.1	83	28	24	3	99	3rd	24	—	
Ngomi Forest	69.1	45.6	81	37	13	6	96	15th	13	1.06	
Umbono	70.2	52.7	77	39	140	2	135	4th	140	.65	
Nongoma	71.9	46.1	86	40	17	2	12	3rd	17	.31	
Hlabisa	75.2	52.9	94	48	13	2	97	15th	13	.44	
Mahlabatini	79.7	41.1	83	39	50	1	50	24th	50	.37	
Empangeni	77.1	49.7	91	39	31	3	22	14th	31	3.26	
Mtunzini	81.0	47.8	88	35	150	3	85	20th	150	4.96	

Meteorological Observations taken at Private Stations for the Month of July, 1910.

STATIONS	TEMPERATURE (In Fahr. Degs.)		RAINFALL (In Inches)						
	Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day		Total for Year from July 1, 1910	Total for same period from July 1, 1909	
					Fall	Day			
Hilton	84	31	52	1	52	7th	52	.77	
Ottawa	—	—	32	—	18	8th	32	1.62	
Mount Edgecombe	—	—	31	4	16	8th	31	—	
Cornubia	—	—	48	—	—	—	48	—	
Milkwood Kraal	—	—	15	—	—	—	15	—	
Blackburn	—	—	27	—	—	—	27	—	
Umzinto, Beneva	—	—	50	3	22	7th	50	1.01	
Riet Vlei	—	—	92	1	92	7th	92	—	
Cedara—Hill Station	83	28	11	1	11	8th	11	.63	
Cedara—Vlei Station	84	21	96	1	96	8th	96	.64	
Winkel Spruit	87	48	98	1	98	2nd	98	1.77	
Giant's Castle	83.95	33.47	15	1	15	15th	15	.69	
Umhlangeni	—	—	16	2	13	16th	16	.88	

Coal and Labour Return.

Return of Coal Raised and Labour Employed at the Natal Collieries for the month of July, 1910:—

COLLIERY	Average Labour Employed					Output Tons Cwt.
	Productive Work			Un-productive Work *	Total	
	Above Ground	Below Ground	Total			
Natal Navigation ..	376	818	1,194	16	1,210	24,503 5
Durban Navigation ..	233	720	953	13	966	19,852 —
Elandslaagte ..	307	712	1,019	25	1,044	17,411 8
Natal Cambrian ..	188	472	660	32	692	12,667 18
Glencoe (Natal) ..	143	439	582	28	610	11,761 14
St. George's ..	218	391	609	—	609	11,596 —
South African ..	162	435	597	11	608	10,272 9
Dundee ..	264	459	723	—	723	10,658 12
Burnside ..	143	266	409	146	555	8,392 2
Hlobane ..	111	336	447	34	511	7,621 5
Hatting Spruit ..	91	293	384	8	392	6,970 1
Newcastle ..	73	305	378	12	390	6,221 13
Ramsay ..	83	161	241	6	247	6,759 1
Natal Steam ..	83	209	292	—	292	3,829 1
Talaca ..	61	146	207	—	207	2,521 —
Ballengeich ..	87	99	186	17	203	2,518 5
West Lennoxton ..	53	81	134	—	134	1,810 17
Dewar's Anthracite ..	12	12	24	5	29	239 —
Makateese Kop ..	2	—	2	—	2	6 —
Totals ..	2,717	6,351	9,071	353	9,424	166,374 14
Corresponding Month, '09	2,604	5,374	7,978	358	8,336	161,183 19

	Productive Work			Un-productive Work	Total, June, 1910	Total, June, 1909
	Above Ground	Below Ground	Total			
Europeans ..	229	203	432	51	482	121
Natives ..	961	4,061	5,022	194	5,220	4,475
Indians ..	1,527	2,090	3,617	105	3,722	3,437

* Cost charged to Capital Account.

Mines Department, Pietermaritzburg,
6th August, 1910.

CHAS. J. GRAY,
Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal Bunkered and Exported from the Port of Durban for the month of July, 1910:—

					Tons. Cwt.
Bunker Coal ..	..	..	..	..	86,918 2
Coal Exported ..	..	..	..	..	19,702 2
Total ..	..	..	..	..	106,620 4

Customs House, Port Natal.
1st August, 1910.

A. D. C. AGNEW,
for Collector of Customs.

Pound Notices.

NOTIFICATION is contained in the *Provincial Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified:—

ON THE 7TH SEPTEMBER.

Good Hope (Klip River)—(1) Merino ram, right ear swallow tail; probable value, £1. Impounded on the 28th July by G. F. van Reenen; (2) One ewe, branded indistinct, left ear swallow tail, right ear winkel haak; (3) One hamel, branded P O; (4) One ewe, brand indistinct, right ear winkel haak, left ear swallow tail and half-moon; (5) One ewe, brand indistinct, left ear winkel haak, right ear, half-moon and swallow tail.

Solferino (Gauton)—Eleven bastard mixed sheep.

ON THE 21ST SEPTEMBER.

Colenso (Estcourt Division)—(1) White cross-bred Persian sheep, hole through left ear; (2) Two black and white cross-bred Persian sheep, hole through left ear; (3) Three merino sheep, hole through left ear; (4) Two black Kafir sheep, hole through left ear; (5) Four black and white cross-bred Persian sheep, various ear marks; (6) One black and white and one yellow Kafir sheep, various ear marks; (7) Four black and white, two brown and white, and one white cross-bred Persian sheep, slit both ears.

Helpmakaar—(1) Black Africander ram, no brands; probable value, £1. Impounded on 1st August by R. A. Caldwell; (2) Black Africander hamel; (3) Black Africander ewe, young; (4) Brown Africander ewe, 2 years old. No brands on any of them. These were impounded on 1st August by Mr. R. A. Caldwell of Uithoek.

Mapumulo—Black ewe goat, half-moon back right ear, aged. Found straying at Kraal of Native Moote, near Sibuyazi, Mapumulo on 1st August.

Mount Hope (Klip River Division)—Merino ewe and ewe lamb, brand looks like R on left hip, no other marks

NOTES.

Mr. John Mattison has been appointed as Poundkeeper at Colenso, *vice* Mrs. Edwards resigned; and Mr. R. H. McAlister as Poundkeeper at Melmoth, *vice* the Gaoler, Melmoth resigned.

Pounds have been established at Kingston, Ixopo and at Newcastle. Mr. Edmund Watling has been appointed keeper of the former and Mr. John Gascoigne, keeper of the latter. In connection with the pound at Kingston the pound at Ashley has been abolished.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Return of Farms at Present under Licence for Lung-sickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Craw	Ladysmith	Scab	Natives	Roosboom
			"	Rooipoort
			H. Nicholson	Ne herton
			Natives	D. lefontein
			"	Klandsaagte
			B. J. Neina'er	Tylden
			D. A. Henry	Knvogel Vlei
A. P. Craw and Murdoch	Ladysmith		P. Grant	Town Land-
			H. W. Nel	Livest Home
			H. Fritchley	Avonford
			Natives	Davel's Hoek
			"	Fourie's Kraal
			"	Mattwana's Kop
			"	Gevonden
			W. M. J. Buys	Ruit Kuil
			T. Allison	Jacob's Ladder
			N Meyer	Klipport
			C. Coventry	Fraughton
			G. I. Perry	Glaston Bag
			J. Bruscott	Elands Spruit
A. B. Kos	Portion of Estcourt		C. Hatting	Doornkop
			G. Spearman	Woodlands
			P. van der Merwe	Vaalbank
			W. Pretorius	Mount Alice
A. C. Williams	Utrecht		Natives	ama
			"	Sparkspruit
			"	Goedehoop
			O. J. Meyer	Spitzkop
			D. M. M. Pfaff	We terseden
			Natives	Gumtree Grove
			"	"
			"	Goede Hoop
L. T. Trenor	Alfred	Lung-sickness	J. T. Clothier	Whitecliff
			E. Fynn	Hughende
			Natives	Location No. 2
			"	No. 6
		Scab	"	Mt. Helio
			"	"
R. Wingfield Stratford and Havemann	Newcastle		Natives	Location No. 2
			W. Osborn	Roo point
			G. M. rails	Koningsberg
			Unknown	Normandien Pound
			C. G. H. Laas	Redcliffe
			Natives	Normandien
			H. J. Hearn	Blackmore
			J. V. Wade	Macclesfield
			D. N. van Rooyen	Les Kop
			Natives	Jubilee
			E. Saunders	Horsehoe
			O. Plutz	Gunderland
			R. S. Miller	Colagh
			A. Tourle	Majuba North
			A. Vanderplank	Eaglescliff
			F. Meyer	Shepherd's Bush
			A. J. van Wyk	Genton
			M. Collyer	Tatham's Camp
			A. M. van Niekerk	Spitzkop No. 5
			J. A. C. Morris	Ern
			M. C. Adendorff	Kendal
			C. J. de Villiers	Waterford
			F. Meyer	Lo Kop
			C. Hodson	Garden Villa
			B. J. Whiggs	Leicester
			F. J. Oonthuysen	River Bank
			A. M. Cronje	Viatslaagte
			Dr. A. J. Abraham	Surrey
			H. J. & W. Yuteman	Fountain Dale
			A. J. Uys	Blaaubosch
			"	O e Tree
			"	Fountain Dale

RETURN OF FARMS UNDER LICENCE, -(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
G. Daniell	Vryheid	Scab	Natives	Trado
			D. Swart	Aloeboom
			W. Landman	riehoek
			Natives	Tonds
			F. Symmens	Hartebeestbult
			Natives	Berlin
			C. Van Rooyen	Nooitgegren
			Native	"
			J. H. Gunter	"
			Nel Bros.	Velgenoeg
			Natives	Dubbelrecht
			J. Radford	"
			L. Kanya	Welgelegen
			Natives	"
			D. De Bruin	Rodepoort
			Natives	Mezeion ein
			J. H. Erland	Goudrij
			T. W. Duker	Grootgewacht
			R. O. van Rooyen	Braaksloot
			Native	Welgelegen
			H. Baing	Prosperit
			L. Bezuidenhout	Nooitverwicht
			Native	Dubbelrecht
			"	Overshot
J. R. Cooper	Nkandha & Ngutu	"	B. J. Human	Eengeneontn
			Natives	Teke Hill
			Petrus Mate	Itela Hill
			Natives	"
			"	Insuzi
			"	Sandwan
			"	Nyongo
			H. Fry	Empandhle
			Natives	Ngutu Town Lands
			"	Macelo
			"	lood River
			"	Mkonjane
			"	Selusbana
E. Varty	Western Umvoti	"	"	Magabeni
			"	Ngutu Fort
			"	Nondweni
			"	Blood River
R. Mayne	Eastern Umvoti & Krantzke	"	"	atshi
			"	Teke Hill
			"	Ngutu Town Lands
			"	Vermaak's Kraal
A. H. Ball	Weenen	"	C. A. Charlewood	Chalgieburn
			J. P. S. van Rooyen	Thomview
			Natives	"
			"	Rigins
B. J. Marshall	Dundee	"	"	Ematimato
			"	Veltevredn
			"	Gruenkop
			"	Ungelegen
			"	Doornkloof
			P. P. van Rooyen	Bellevue
			L. J. van Rooyen	"
			T. J. van Rooyen	"
			Native	Zypherfontein
			W. W. Harding	Milietun
J. F. van Rensburg	Ngotshe	"	W. M. Lotter	Waterfall
			P. H. van Rooyen	Buffalo Hoek
			A. Jansen	Sheepridge
			L. Badenhorst	Klipfontein
			A. J. G. Meyer	Doornkop
			Native	Ontbemand
			"	Moy
			"	Dumain
J. F. van Rensburg	Ngotshe	"	"	Waterfall
			Unknown	Dundee Pound
			P. J. C. Liversage	Toversnarsue
			P. J. Swart	Rietfontein
			M. J. Herbat	Klipdij
			C. J. van Rooyen	Berred
			Natives	Rietfontein
			"	Klip Rivier
J. F. van Rensburg	Ngotshe	"	"	Smaldeel
			"	"

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
E. W. Larkan	Umsinga	Scab	Native	Gordon M moria Jobskop
K. Ripley	Emtonjaneni	"	"	Verna k's Kraal Kwamagwaza
C. E. Walker	Portion of Estcourt	"	Wm. McFie	Koninsberg Highlands
		"	"	Lowlands
		"	S. F. Boshoff	Niekerksfontein
		"	S. B. Sallatt	Stanger's Hoek
		"	H. J. K. Miller	Beacon Hill
A. Hair	City and Umgeni	"	S. C. Marais	Malan Spruit
		"	Native	Bishopstowe
		"	Gert. Bact.	Golf Links
J. Radford (acting)	Pau'pietersburg	"	Natives	Zwaartkop Location
E. W. Bowles	Icopo	"	H. Rohrs	Altona
		"	C. J. Webb	Rocky Glen
		"	W. Whitelaw	Glenmaize
J. W. Stewart	Bergville	"	Natives	McKenzie
		"	F. Zinckel	Keanline
		"	Moeder & Sons	Zuur Plaats
E. J. B. Hosking	Richmond	"	D. D. Newton	Roodebult
H. van Rooyen	Babanango	"	A. Wright	Hamilton
		"	Natives	Onvegenoge

Division of Agriculture Notices.

FEES FOR AGRICULTURAL ANALYSIS.

It is hereby notified that Farmers and others can secure analytical determinations from the Government Laboratory, Central Experimental Farm, Cedara, in accordance with the following scale of fees, which is subject to revision :—

	Scale I.	Scale II.
	£ s. d.	£ s. d.
MINERALS TESTED FOR PHOSPHATE :		
Qualitative	0 7 6	0 5 0
Quantitative	0 10 6	0 7 6
Complete	1 1 0	0 15 0
FERTILISERS AND FEEDING STUFFS :		
Determination of 1 constituent	0 7 6	0 5 0
Determination of 2 or 3 constituents	0 15 0	0 10 0
Complete analysis	1 1 0	0 15 0
SOILS : Partial analysis of a soil in relation to its fertility		
Complete analysis of a soil	1 1 0	0 10 6
Complete analysis of 2 soil	2 2 0	1 1 0
Complete analysis of a soil, with mechanical analysis	3 3 0	2 2 0
WATER : Irrigation and drainage		
... ..	1 10 0	0 10 6
VEGETABLE PRODUCE : Fodder, Ensilage, Grain, &c.		
... ..	1 10 0	0 15 0
MILK, CREAM, BUTTER : Fat only		
... ..	0 5 0	0 2 6
" " : Complete	0 15 0	0 7 6
WATTLE BARK AND TEA : Tannin		
... ..	0 5 0	0 2 6
CATTLE DIPS : Qualitative analysis of 1 to 3 principle constituents		
... ..	0 10 0	0 5 0
Quantitative analysis of 1 to 3 principal constituents	1 1 0	0 10 6
INSECTICIDES :		
Qualitative analysis each constituent	0 5 0	0 2 6
Quantitative " " "	0 10 0	0 5 0

Scale No. 1 is applicable to samples handed in by merchants and Dealers, and where trade interests are involved.

Scale No. 2 is applicable to samples forwarded by *bona fide* Farmers and Gardeners.

All fees are payable in advance.

Samples will be accepted at the discretion of the Director, and must be properly selected and labelled.

The Department reserves the right to publish the results of any analysis performed by it; and, where such is deemed of sufficient public interest, it will remain at the discretion of the Director to remit any charges hereunder.

All samples must be addressed to the Chemist, Central Experimental Farm, Cedar a

TREES FOR SALE.

To encourage tree-planting, transplants and seeds of forest trees are supplied by Government, so far as in stock, at the undermentioned rates, exclusive of carriage, from the Government Nursery, Central Experimental Farm, Cedar.

Transplants of Eucalyptus, Pines, Acacias, Casaurinas, Cupressus, etc., about 25 trees in each tin, at 8s. 4d. per 100 trees. Trees in separate tins at 1s. each.

Transplants of scarce kinds, larger trees, or surplus stock, when available, will be charged at special rates, which will be furnished on application.

Tree seeds, in variety, at 6d. per packet. Price per pound, which fluctuates, will be furnished on application.

Package and postage of seed, when required, charged 1s. per lb. extra.

Orders cannot be accepted for a smaller number than 100 trees.

PURCHASE OF TREE SEEDS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

POULTRY.

Cockerels and a few Pullets of the following breeds for sale:—Buff Orpingtons Wyandottes, Plymouth Rocks and Black Leghorns.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible:—

Admittance of Students to the School of Agriculture.—House Master, Cedar.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedar.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedar.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedar.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.
 Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.
 Fruit.—Orchardist, Cedara.
 Accounting Business.—Accounting Clerk, Cedara.
 Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.
 Apiculture — Aviarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry, Cedara.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

Charges in respect of Cattle and the Meat of Cattle.	Calves up to one year old.	Cattle over one year old.	
		Rate per single head.	After reaching 100 head in month.
<i>Abattoir.</i>			
1. Receiving, per head... ..	s. d.	s. d.	s. d.
2. Killing and Dressing, per head	0 3	0 6	0 3
3. Disinfectants	2 0	3 6	2 9
4. Cleaning Tripes, each	0 1	0 1	0 1
5. „ Sets Feet, per set	0 6	0 6	0 6
6. „ Calves' Heads, each	0 6	0 6	0 6
	0 9	—	—
<i>Bagging Charge</i>			
1. Per Body of Beef	1 3	2 6	1 9
2. Bagging Labour, per body	0 3	0 6	0 3
Hessian, 3d. per yard.			
<i>Special Storage Rates for Chilling up to 72 hours.</i>			
1. Chilling Beef, per body	1 3	2 9	1 9
2. Chilling Offal, per set	0 6	1 0	0 6

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.

Department of Agriculture, Maritzburg, 21st December, 1908.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1906).

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement after 25th April next. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 131.—Age 20. Was a student at College of Agriculture, Cape Colony, where he gained a diploma. Has also won prizes for butter making at the Rosebank and Port Elizabeth Shows. Has been in the services of the Orangia Creamery Co., Bethlehem, which he left on account of conditions of employment not being suitable to his requirements.

No. 132. Age 37. Has had nine years experience as Assistant and Manager on Tea Estate in Assam, and has a thorough practical knowledge of tea making in all its Departments. Would like to obtain an appointment in a Tea Garden in Natal. Has a knowledge of several Indian languages.

No. 133.—Desires appointment as Farm Manager. Has had a thorough knowledge of growing and packing fruit, also lucerne growing and hay making. Has also had experience in Ostrich and Stock farming.

No. 134.—Age 37. Wishes to obtain experience on an Ostrich farm for a year. Would be willing to invest £700 at the end of the term of probation, and on the expiry of a year's partnership would be willing to increase that sum to £1 000.

No. 135.—Age 35. Has a knowledge of poultry and bee-keeping. Total abstainer. Non-smoker. Good references. Is anxious to get on to a farm.

No. 136.—Wishes to secure employment on an Ostrich farm. Very good references.

No. 137.—Understands carpentry and wagon making. Is anxious to secure a position on a farm.

No. 139.—Age 25. Seven years' experience in mixed farming in Springfield District.

No. 140.—Age 25. Colonial born. Has had 3 years experience on farm. Two years in the Mooi River Division, and one year Dairy Farming in the Transvaal. Good references; speaks Zulu.

No. 141.—A married man seeks employment on a farm, has had much experience with stock. Understands Native language.

No. 142.—Age 36. Tea Planter, twenty years experience, India, Ceylon and Natal. First class references and gold medalist. Expert knowledge of Tea factory engineering, planting, and manufacture—New openings a speciality. Fluent Indian linguist, and capable business man. Wishes to take over complete charge of large Tea concern. Liberal salary expected, and first class work guaranteed. Correspondence invited from Companies or Capitalists.

No. 143.—Experience on gardening and agricultural work. Wishes to obtain situation on a wattle plantation, stock, agricultural, or mixed farm. Would prefer in be near Maritzburg if possible but must be in Natal.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

EMPLOYMENT FOR GIRLS.

The Minister of Agriculture has received a letter from the Chairman of the Transvaal Land Settlement Board, stating that he has been asked by several correspondents in England if there are any openings in South Africa, such as in creameries, for girls trained at Bromsgrove Colonial College and other such training centres in England. We should be glad to hear from any institutions or farmers in Natal who may be in a position to offer situations to girls who have been trained at such Colleges, when we shall be pleased to place them in communication with the Chairman of the Transvaal Land Settlement Board.

Farm Apprentices' Bureau.

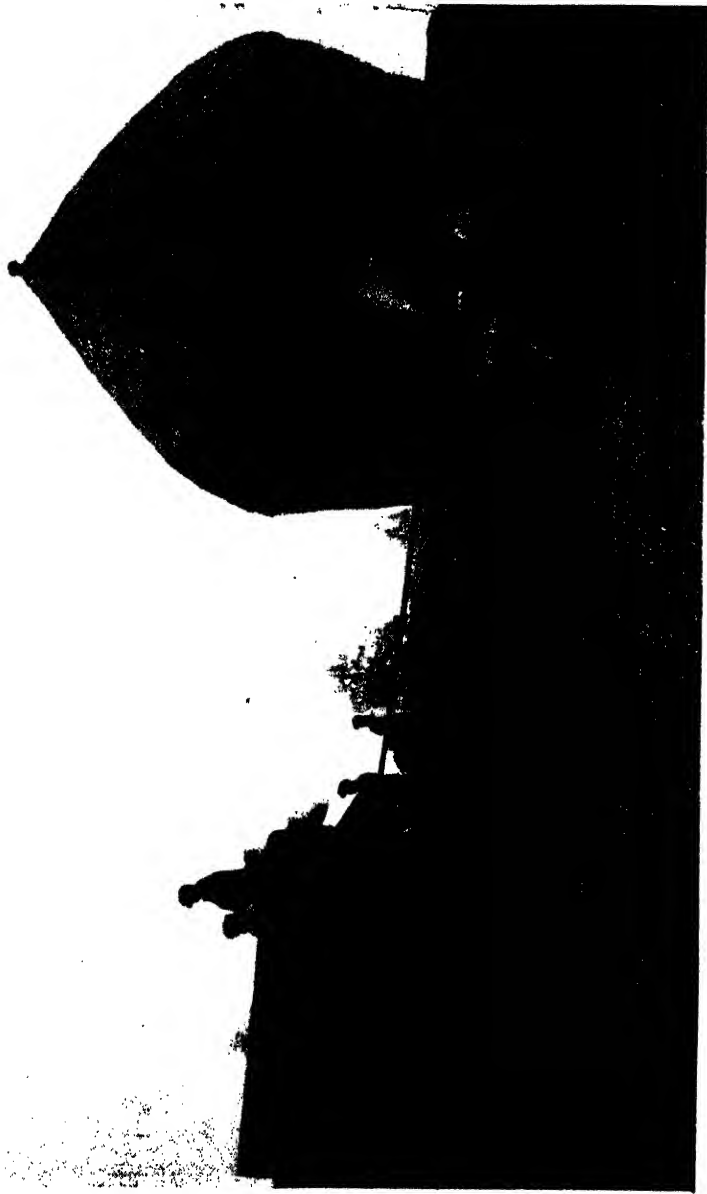
THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | | | |
|-----|-----|---------|--|---|
| No. | 3. | Age 24. | Colonial born | Has a knowledge of bookkeeping. |
| " | 15. | Age 19. | Is desirous of learning farming. | |
| " | 25. | Age 23. | Bricklayer by trade. | Is anxious to get on a farm. |
| " | 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. | |
| " | 40. | Age 24. | Has had a little experience of farm life. | Understands bee-keeping. Is anxious to get on a farm. |
| " | 47. | Age 21. | Is anxious to obtain a situation on a farm. | Has been in iron-mongery trade for 2½ years. |
| " | 53. | Age 17. | Has had 18 months' experience of farming in Zululand. | Speaks Zulu. Understands cattle and horses. |
| " | 56. | Age 20. | Strong, tall and healthy, good rider, fond of stock, and has had some years experience of general farming. | Small salary required with board and lodging. |

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.



THRESHING CORN AT THE R.A.S.E. TRIALS.

(See Article on Motors in Agriculture by Mr. Loudon M. Douglas in the present issue.)

The Natal Agricultural Journal.

A Suggestive System.

Sound farming, not dosing of the land, is what is required to save it from running down or to restore it when once reduced.—*Prof' Shelton.*

IN every business, and particularly in businesses which are concerned with the conversion of commodities from a less useful form to a more useful form, according to the needs of man, one of the chief concerns is the reduction of the cost of production in order to obtain increased profit, either directly by keeping the selling price of the commodity at the old level and so enlarging the margin of profit, or indirectly by reducing the selling price of the commodity and thereby inducing larger sales. In farming, equally as much as in other businesses, this principle holds good, and must be attended to if the largest possible returns are to be secured. Whether we are concerned with the relative costs of different feeds for our live stock—not forgetting that a cheap feed (for instance, grass) becomes an increasingly dear one, relatively, as its feeding value diminishes—whether we are concerned with the question of the relative economy of machinery and manual labour in the growing of crops, or the question as to which is likely to prove the more economical: larger and higher-priced and possibly more efficient machinery, or smaller and lower-priced and possibly less efficient machinery; or whether we are concerned with the question of the best of maintaining and enhancing the fertility of the soil: whichever question we are concerned with, the whole matter resolves itself into this, that we are anxious to enlarge the margin of profit on the products of our farm by lessening the cost of production. That is, in fact, the basis of the business side of farming—and without a business

side farming may as well be left alone. Even the best of practical farmers, men who have been farming for many years, are liable to make mistakes—mistakes, that is, of this kind; that their profits are not as large as they might be because they are spending more in producing than they really need to obtain as good results. We quoted, in our last issue, an interesting instance of this narrated by a correspondent of the *Farmers' Gazette*, Dublin, of a neighbour of his—"a good tillage farmer," and probably as good as there is in his county—who asked a Government expert to value a potato manure which he had bought at £8 10s. per ton. The expert examined the analysis provided with the manure, and found that it was really only worth £3 10s. per ton—a loss of £5 per ton on a potato manure alone! We admit, of course, that this may be an extreme case, but at the same time it serves to show how easy it is for even an experienced farmer, who is regarded as one of the best farmers in his district, to make a mistake and lessen his margin of profit by spending more than is really necessary in the production of a commodity.

We have been indirectly led to these reflections by a perusal of an interesting work, to which our attention was drawn by Mr. F. F. Churchill (late Member of the Natal Legislature), by Mr. Robert H. Elliot, descriptive of the Clifton Park system of farming.* The system described has for its object the increase of the fertility of the soil by what may be termed natural means—that is, without the addition of manures. The cost of the preparation of the ground for the purposes of this system is far less than the total cost of the manures which would under ordinary conditions be applied during the several years that, under the Clifton Park method, crops can be grown without manures. In other words, the cost of production is apparently greatly reduced, and not is the soil itself improved physically, but also a larger margin of profit in respect of the crops grown is evidently secured.

Briefly described, Mr. Elliot's system "consists" (I use his own words) "of creating, with the agency of large-rooting and deep-rooting plants, a good sod, and then relying on it for the manure (except the turnip manure) and physical conditions necessary for growing two green and two cereal crops, after which the land is again laid down to grass, and the creation of a good sod again commenced." For the purpose of obtaining a desirable sod, Mr. Elliot has devised his own seed mixtures. One of these is: Cocksfoot 14 lbs. of seed, tall fescue 5 lbs., crested dog-tail 2 lbs., hard fescue 3 lbs., smooth-stalked meadow grass 2 lbs., golden oat grass 1 lb., white clover 4 lbs., alsike clover 2 lbs., perennial red clover 1 lb., yarrow 1 lb., birdsfoot trefoil $\frac{1}{2}$ lb., total 35 $\frac{1}{2}$ lbs. per acre.

* "THE CLIFTON PARK SYSTEM OF FARMING AND LAYING DOWN LAND TO GRASS: A Guide to Landlords, Tenants, and Land-Legislators." By Robert H. Elliot. London Simpkin, Marshall, Hamilton, Kent & Co., Ltd., 1908.

A second one is: Cocksfoot 10 lbs., tall fescue 3 lbs., crested dogstail 2 lbs., hard fescue 3 lbs., smooth-stalked meadow grass 2 lbs., golden oat grass 1 lb., burnet 3 lbs., chicory 1 lb., parsley 1 lb., ribgrass 1 lb., yellow suckling clover 1 lb., kidney vetch 1 lb., lucerne 2 lbs., late-flowering red clover 2 lbs., white clover 3 lbs., alsike clover 1 lb., yarrow 1 lb., birdsfoot trefoil 1 lb., total 39 lbs. per acre. A third mixture which Mr. Elliot has used is the following: Cocksfoot 6 lbs., meadow fescue 5 lbs., tall fescue 4 lbs., tall oat-like grass 3 lbs., hard fescue 2 lbs., rough-stalked meadow grass $\frac{1}{2}$ lb., smooth-stalked meadow grass 2 lbs., golden oat grass $\frac{1}{2}$ lb., Italian ryegrass 4 lbs., white clover 2 lbs., alsike clover 2 lbs., late-flowering red clover 2 lbs., kidney vetch $2\frac{1}{2}$ lbs., chicory 2 lbs., burnet 8 lbs., sheep's parsley 1 lb., yarrow 1 lb., total $41\frac{1}{2}$ lbs. per acre. Still another mixture contains: Cocksfoot 10 lbs., meadow fescue 5 lbs., tall fescue 4 lbs., tall oat-like grass 3 lbs., hard fescue 1 lb., rough-stalked meadow grass $\frac{1}{2}$ lb., smooth-stalked meadow grass 1 lb., golden oat grass $\frac{1}{2}$ lb., Italian ryegrass 3 lbs., white clover 2 lbs., alsike clover 1 lb., late-flowering red clover 2 lbs., kidney vetch $2\frac{1}{2}$ lbs., chicory 3 lbs., burnet 8 lbs., sheep's parsley 1 lb., yarrow $\frac{1}{2}$ lb., total 48 lbs. per acre.

These four examples will be sufficient to show the nature and the mixtures used by Mr. Elliot under his system. The main objects, in making a selection of plants for the production of a good sod, according to the Clifton Park systems, are, firstly, to secure a good root system, and especially a deep one, and, secondly, to obtain good bushy growth. The deeper the root formation the deeper will the soil become, and the larger generally the root system is the greater will be the production of humus.

The production of humus is, indeed, the keynote to Mr. Elliot's whole system, and it will be as well to recapitulate—in Mr. Elliot's own words, as embodying his view and the importance of this essential of fertility—the value of humus in the soil. "Humus," Mr. Elliot says, "is that substance which gives value to forest soils, or newly broken-up pasture lands. It is at once a manurial agent, and a maintainer of the physical condition of the soil; but perhaps most valuable of all for *its effect in conserving that moisture which is often of more importance to the plant than the presence of any quantity of chemical manurial constituents*.* It is, indeed, the very life and soul of the soil, and that is why the farmer, the planter, or the gardener attaches so much importance to farmyard manure, forest topsoil, turf, or any substance which will supply this indispensable ingredient of fertile soils. These humus-supplying agents all have this immediate advantage—the fact that the results from them are certain, while the results from all purchased manures are uncertain, for the latter may be washed away, or enter into insoluble compounds in the

* The italics throughout are our own.—ED.

soils, and in the event of a drought the anticipated results might not be gained. . . . One thing is certain, says Roberts, . . . and that is that the application of farmyard manure, in almost any form, will result in improved fertility and increased profits. But this arises not from its, strictly speaking, chemical constituents, which could, of course, be supplied by chemical manures, but from the fertility which the decaying vegetable matter of the straw imparts to the soil, the most important feature of which is probably owing to *the power of humus for conserving moisture, seeing that plants more often fail from lack of moisture, at a critical period of their growth, than from dearth of chemical constituents of plant food*; and it is of equal importance to note that, as all the moisture in the soil may be needed, and often is needed, in the growing season, it is most advisable to store, through humus, all that can be kept in the land."

In other words, the physical condition of the soil is improved by a plentiful supply of humus; and one of the benefits which this improved physical condition involves is a better moisture-retaining capacity.

But one of the essential points of Mr. Elliot's system is the claim he makes that the production and later ploughing under of a good turf benefits succeeding crops from a *manurial* point of view. How this can be when it is realised that what we plough in is just what has grown on that soil—that is, we return what we have taken out—may seem somewhat difficult of comprehension, but the explanation is not far to seek. If the lists of mixtures for sod-producing purposes, reproduced above, are examined, it will be noticed that they comprise a very considerable proportion of leguminous plants. Mr. Elliot, so far as we can find, does not touch upon—or at least does not emphasise—this feature of his mixtures, but there can be no doubt that it is to the inclusion of these leguminous plants that Mr. Elliot owes a no inconsiderable amount of the success which has attended his system in practice. As every farmer knows, or ought to know, the legumes constitute a family that has the power of drawing upon the atmosphere for its supplies of nitrogen—in other words, the legumes provide a suitable host for a certain class of bacteria which make use of the atmospheric nitrogen, and, in doing so, convert it into a form in which it can be utilised by the host plant. The growing of legumes thus involves the enrichment of the soil from a nitrogen point of view.

This inclusion of legumes in Mr. Elliot's "grass" mixtures thus accounts, in part at least, for the subsequent enrichment of soil in nitrogen. In regard to the mineral elements of plant food, we have to turn again to humus and further examine its virtues, which, as before, we will do in Mr. Elliot's own words. Humus, he says, "not only supplies nitrogen" (though he does not say how it supplies nitrogen beyond returning what

has been taken out of the soil in the course of the formation of turf), "but, as it decomposes, renders available some of the phosphoric acid and potash of the soil. By keeping the soil open it aerates the land, and so sets free more plant food." Furthermore, "it enables the soil to retain manurial matter which would otherwise leach away." To understand this it must be realised that, because we find it necessary to add artificial fertilisers to a field, it does not follow that the soil of that field does not contain the elements the seeming absence of which we are endeavouring to counterbalance. Most soils contain quite considerable quantities of phosphoric acid and potash, but they occur for the greater part in forms in which they cannot be made use of by plants; by a wrong system of farming we have gradually removed all the available portions of the elements of plant food, and, finding our crop returns diminishing, we make up for the deficiency by adding chemical fertilisers. Humus, however, as Mr. Elliot says, helps to liberate the stores of plant food in the soil, and the result is that, after humus has been incorporated with the soil, much better crops will be obtained than hitherto was possible without manure, and artificial fertilisers can, not wholly perhaps but to a very great extent, be done away with. At any rate the cost of production is lessened and the margin of profit thus increased—which was the point we set out with at the beginning of this article.

We think we have made fairly clear in the foregoing the principles of Mr. Elliot's system. As will have been seen, it consists, briefly, in the formation of a good sod by means of plants having a liberal root system, and the ploughing under of this sod after the lapse of a few years—say, four or five—the result being that the soil is enriched to such an extent as to reduce very materially the cost of manuring, and in some cases to obviate the necessity for artificial manuring altogether. The question of whether artificial manuring can be eliminated altogether naturally depends upon the nature of the crops grown. If green forage crops are to be grown, then as nitrogen is the chief constituent required, artificial manuring will be unnecessary; but if root or grain crops are grown, which require mineral fertilisers, a certain amount of artificial manure will be necessary, but at the same time the quantity required will be much less than is needed under our ordinary system of farming. "So far as I am personally concerned," Mr. Elliot says—and he is an old and experienced and at the same time well-informed farmer—"I have solved the problem as regards cultivating poor lands without the aid of any manure, and have solved it to the extent of growing, on the poorest of land, crops as good, and indeed, I may say, much better, than those commonly grown on the best land; and I have done this, too, after leaving the land only four years in grass, and on a system which is continually improving the fer-

tility of the soil, and increasing the depth available for the roots of plants."

This last point—the deeping of the soil—is another feature of Mr. Elliot's system which readers would do well to study. "It is important to notice," Mr. Elliot says elsewhere, "that, as a consequence of growing a deep-rooted turf, you can deepen the soil above and add to it below." He goes on to say that in the case of one of his fields, the ploughing depth has been increased from six to nine inches by the growing of sod on the plan advocated by him. This is certainly a very important consideration, since it tends to lessen the cost of ploughing and renders deep ploughing much easier and much safer.

There is just one more point ere we conclude. It may be objected by some—although to others the whole thing will be obvious—that in thus leaving a field down in sod for, say, four years, you are preventing it from bringing in any direct return. This, however, is a mistaken idea, as the field can be pastured—and very good pasture will it afford, too. This, in fact, is what Mr. Elliot himself does. Of course, the direct return thus obtained may not be as large as if the land were cropped (though this depends on the nature of the crops grown), but there is this additional consideration, that when the field is ploughed up and planted with ordinary farm crops the increased return will much more than compensate any slight loss which may be sustained in leaving it in sod previously for a term of years.

In conclusion, we strongly recommend readers interested in Mr. Elliot's system to invest in a copy of his book. It will well repay perusal.

The most successful farmers are those who avoid drudgery by finding an easy and quick way of performing difficult work. An active brain can greatly save tired limbs and an aching back.

The Acting Chief Conservator of Forests for the Union (Mr. J. Storr Lister) has notified, in terms of Natal Proclamation No. 58 of 1903, that licenses for the collection of wattle seed and medicinal herbs within Crown Forest Reserves in the Natal Forest Conservancy will be issued by Forest Officers on application, and on payment at the rate of 1s. per person per diem for such licence.



Farming Progress In Rhodesia.

IN the course of his opening address at the recent annual Conference of the Rhodesia Agricultural Union, the President (Mr. J. A. Edmonds) gave a brief and lucid exposition of the progress of agriculture in that Colony during the year. Considerations of space preclude our reproducing the address in full, but the salient points of the speech, which we give herewith, will, we think, be read with interest. In reviewing the position of the farming industry during the past year, Mr. Edmonds drew attention to the following points, which stood out in a noticeable degree, *viz.*: (1) The large increase of arable land, resulting in a far larger proportion of maize; (2) freedom from the plague of locusts; (3) the increase in the number of cattle and the improved methods in winter feeding, by means of utilising the hay of the country; (4) a better understanding with the mines, particularly with regard to direct contracts for meal and grain supplies; (5) the opening up of additional markets for farm produce; (6) the increase in the number of private dipping tanks in use; (7) the growing desire to construct farm fences; (8) the probability of the building of additional railways to open up new farming and mining areas; (9) an increase in the number of irrigation schemes; (10) better facilities for obtaining labour from the northern territories, through the agency of the Rhodesian Native Labour Bureau; (11) the advancement of the co-operative principle amongst farmers; and (12) the improvement in educational facilities to meet rural requirements.

Perhaps the most important feature of the year, Mr. Edmonds went on to say, so far as they, as an agricultural community were concerned, was the number of new settlers who had taken up land, and thrown in their lot with Rhodesia. This was an increase in the best asset any Colony could obtain. In conjunction with this pleasing feature in the development of their country, there had been a great and noticeable advance in their sister industry, that of the mines, resulting in additional capital for mining development, and the increased interest shown by South African

and London capitalists in the great mineral possibilities and resources of Rhodesia. These two features had resulted in a substantial advance in the value of farm lands, creating a natural desire for a better and closer definition and understanding of the respective rights and privileges of the farmer and mines. Speaking of East Coast Fever, Mr. Edmonds said that the increase in the number of outbreaks of this disease during the past few months was the gravest matter farmers had had to face during the past year. Discussions and meetings had been generally held all over the country in connection with this dread scourge, and it was satisfactory to note that a committee was shortly to be appointed to collect evidence on the situation and to advise on the best policy to adopt in order to restore confidence in the past development of Rhodesia. This Congress would provide a fitting occasion for an expression of opinion on this important subject. Mr. Edmonds referred also to the appointment of an irrigation engineer, the starting of a stud stock farm, and the institution of better terms to encourage fencing, all of which, as he said, were direct evidence of the importance attached by their Government to the proper fostering of the farming industry.

Government Tractors for Transport Purposes.

Official notification has been issued that the Government is importing several tractors for the purpose of undertaking transport for farmers and others in this Province in those districts in which large quantities of produce, etc., require removal, and in which the roads and other conditions are suitable for the use of tractors. The rates to be charged for such transport have not yet been decided upon, but these will be as low as possible, the object being to assist the producer and to fix rates sufficient merely to cover costs of maintenance. Persons having large quantities of produce, etc., requiring to be transported are requested to send full particulars to the Director of Transport, stating the distance in miles from the station, the condition of roads and country, whether labour is available for loading and off-loading, the date such transport is required, and giving all possibly information. Applicants will be advised in due course whether their work can be taken in hand and the rate to be charged for same.

Agricultural Machinery at Brussels Exhibition.

The Acting Under Secretary for Agriculture for Natal has received from the Assistant Secretary to the High Commissioner for the Union in London a cutting from the *Times* Engineering Supplement for the 24th August referring to British machinery exhibits at the Brussels Exhibition. Mention is made of oil tractors, steam ploughs, and threshing machines, among others; and as the description of the exhibits under

these heads given by the *Times* will probably prove interesting to many of our readers, we reproduce the notes below.

Oil Tractors.—An agricultural tractor, with two cylinders capable of giving 35 b.h.p. and burning paraffin, is to be seen on Messrs. Marshall's stand. It is fitted with three speeds, of 2, 4, and 6 miles an hour, with reverse on the lowest. A still more powerful tractor by the same makers, suitable for heavy haulage and military purposes, was withdrawn from the Exhibition at the urgent request of the Natal Government. It had a four-cylinder engine developing 60 b.h.p. at 750 r.p.m. It carried 115 gallons of paraffin in two tanks under the frame, and could haul 7 or 8 tons on good average roads for 80 or 100 miles without the fuel or water tanks being replenished.

Steam Ploughs.—There are two exhibits of steam ploughing engines, representing respectively the "two engine" and the "one engine" systems. In the former the plough or other cultivating implement is hauled backwards and forwards by wire ropes between two engines which are stationary while the hauling is in progress but move forward as each successive portion of the field is finished. The inventors of the system, Messrs. John Fowler & Co., of Leeds, show a compound engine, working at a steam pressure of 180 lbs. per square inch, which is suitable for use in connection with it. In the other, or "one engine," system the engine travels over the ground, hauling the plough after it. The cost of the plant for this method is less than for the other, but its application is restricted by the fact that the ground must be sufficiently hard and firm to prevent the engine from sinking in. The engine shown by Messrs. J. and H. McLaren (Limited), of Leeds, for employment in this way is a compound working at 200 lbs. pressure, and a special widening ring can be attached to the wheels to enable it to work over land into which it would otherwise sink. The same firm show their patent steam ploughs for direct traction. They are for four furrows, but while one is of the standard pattern the other has patent subsoilers, which enable the ground underneath the ploughing to be stirred without bringing the subsoil to the surface.

Threshing Machines.—Though not essentially different in principle from those of a generation ago, the threshing machines of to-day embody numerous improvements in details, calculated to enhance both their capacity for continuous work and the quality of the product they turn out. Excellent examples of modern practice are shown by Messrs. Clayton and Shuttleworth, Messrs. Richard Garrett & Sons, Messrs. Marshall, Sons, and Company, and Messrs. Ruston, Proctor & Co. The last-named firm

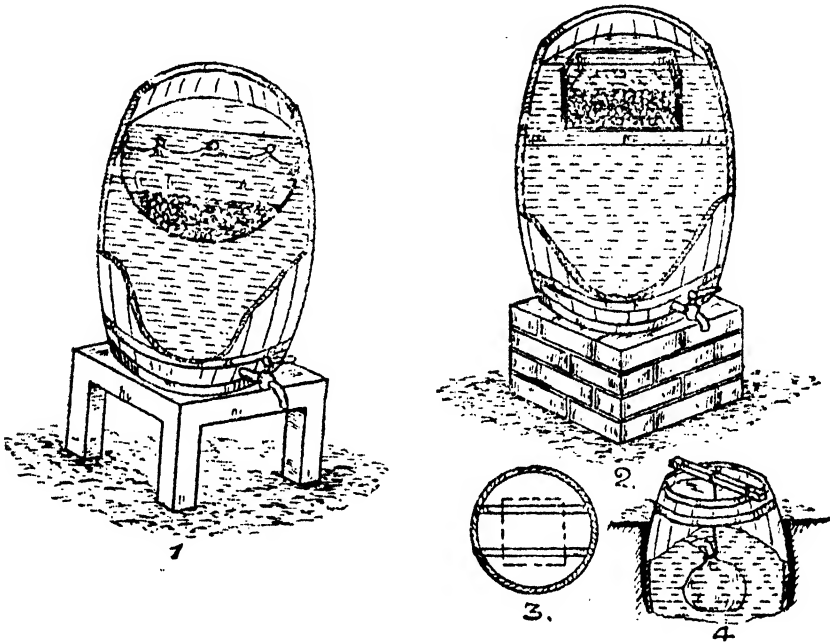
also show a related machine in the shape of a clover-huller, fitted with a 17 feet elevator, which is made to fold up when travelling.

Liquid Manure.

Manure in a liquid form possesses several advantages over solid manure for the purpose of supplying growing plants and trees with the food and nourishment that is so essential to assist and ensure the production of fine and abundant crops, and in every garden of any size provision should be made for making or obtaining a supply. Plants, trees, and garden crops generally should not be overfed or over-stimulated by large quantities of manure during the early stages of growth, or sappy shoots and luxuriant foliage instead of produce is very liable to result, the period when abundance of food and support are beneficial and desirable being during the time the energies of the plants or trees are taxed in the formation and development of flower, fruit, or produce, as the case may be, and this is when liquid manure should be applied. The reasons why liquid manure is preferable to solid manure for the purpose mentioned is that it is more speedy in its beneficial effects, more easily assimilated, need not be applied until required, and its effects are well under control and can be increased or decreased by regulating the quantity allowed. In the course of an article on this subject in a recent number of *Farm, Field, and Fireside*, a writer gives some useful hints on the preparation of liquid manure, together with illustrations which we reproduce herewith. He remarks that liquid manure should always be well diluted with water, or harm is likely to result instead of good, and the best time to apply it is during or after rain when the ground is moist, so that the liquid can immediately percolate to the roots of the plants. If the soil is dry and parched, it should be well soaked with clear water an hour or two before the liquid manure is applied.

Liquid manure made from artificial fertilisers, the writer goes on to say, is excellent for many purposes, and especially for pot plants where smell is undesirable, but for general garden use liquids made from animal manures are the best. Horse, cow, sheep, and poultry manure are all suitable, and much improved by the addition of a little soot, whilst soot water alone also forms a useful stimulant. Half a bushel or so of either horse, cow, or sheep manure, together with half a peck of soot enclosed in a canvas bag, will make from thirty to forty gallons of liquid manure, whilst a peck of fowl or pigeon manure, which is very strong, will make a similar quantity. Several simple contrivances for making liquid manure for garden use are illustrated in the accompanying sketches, a well-made

cask being brought into use in each case. To make the arrangement shown in fig. 1, a number of hooks should be screwed round the inside of the cask



several inches from the top, and a corresponding number of rings be sewed to a piece of sacking or canvas, which is then hung from the hooks inside the cask as shown. The cask should be raised from the ground on a base, and have a tap near the bottom. The manure and soot are placed in the suspended canvas and the cask filled with water, and, after being stirred about every day for a week or so the liquid will be ready for use.

In the case of fig. 2 two bearers or pieces of wood are fixed across the inside of the cask, in the position shown in fig. 3, and a good-sized box without a bottom obtained. The underside of the box should be covered with a piece of coarse perforated zinc, and the manure and soot be placed inside after it has been arranged on the wooden bearers in the cask as shown. Fig. 4 illustrates the simplest method of making and storing a small quantity of liquid manure, the cask in this case being sunk in the ground and the manure and soot enclosed in a bag suspended by a cord from a piece of wood across the top. A point to be borne in mind is that feeding with liquid manure should be gradually discontinued as the crops reach maturity.

E.C. Fever Regulations.

It having been considered expedient to amend the Regulations in regard to the movement of cattle and meat in the Province of Natal, the Minister of Agriculture has issued a notice ordering that the several Magisterial Divisions of this Province shall be infected areas within the meaning of Section 3 of Act 54, 1906 (Natal), and prohibiting the ingress, egress or movement of cattle into, from or within the several infected areas. The Notice proceeds: "(3) Notwithstanding this prohibition, movement of cattle required for immediate slaughter for supply of meat may be allowed under permit issued by the Magistrate of the area concerned, provided he is satisfied that there is no danger of spreading East Coast Fever by any such movement, and of the fact that the applicant for any such permit requires the cattle for *bona fide* slaughter purposes, and such Magistrate is also empowered to grant a special permit for the movement of healthy cattle (other than those intended for slaughter) in any case in which any such Magistrate is satisfied that the removal is justified by necessity. The removal of cattle under any permit issued in terms of these regulations must be carried out within the time and according to the directions specified in the permit and not otherwise.

"(4) In the case of healthy cattle coming to the Province of Natal from oversea or across any inland Border, the Chief Veterinary Surgeon is empowered to grant permits for their introduction into the Province and their conveyance by rail to their destination or so near thereto as the railway runs, subject to such special conditions as he may insert in any such permit. (5) And I do further prohibit all persons from moving or causing to be moved within the Province, except on permit granted by a Magistrate, the following:—(a) The hide, the head, the tail, the leg below the knee or the hock of any cattle; or any horns, hoofs, hair or offal thereof; (b) Hay, cut grass, moss, lucerne or other fodder; (c) Manure or litter from, or which may have come from, places where cattle are kept. (6) The Chief Veterinary Surgeon is also empowered to grant permits for the conveyance by rail of forage or lucerne in transit to or from any other part of the Union, or required as food for animals in the like transit. (7) In terms of the Natal Act No. 32 of 1903, any person disobeying this order is liable to a fine not exceeding £100, or to imprisonment with or without hard labour, and with or without the option of a fine, for any period not exceeding six months. (8) This order shall take effect immediately on publication in the *Gazette*, and shall remain in force for a period of six months, unless otherwise amended or repealed. (9) From and after the date of publication of this order, all orders previously made, as set forth in the schedule annexed hereto, shall be and are hereby superseded and withdrawn."

The Schedule referred to in the concluding clause of this Notice is as follows:—Natal Government Notices Nos. 106, 285, 312, 342, 419, 474, 503, 505, 507, 530, 559, 561, 572, 573, 576, 588, 601, 603, 604, 612, 637, and 711 of 1908; Nos. 74, 120, 131, 175, 176, 193, 206, 208, 223, 224, 225, 226, 227, 229, 269, 342, 343, 352, 356, 576, and 577 of 1909, and No. 167 of 1910. Union Government Notices Nos. 305 and 435 of 1910.

Ports of Entry on Cape-Natal Border.

The following Proclamation (No. 87, 1910), has been issued by His Excellency the Governor-General:—"Whereas it has been made to appear to me to be expedient to withdraw Cape Proclamation No. 102, dated the 18th March, 1910, defining the ports of entry on the Cape Province-Natal Border for the admission into that Province from Natal of human beings and articles or things therein specified, and to make other provision in lieu thereof: Now, therefore, under and by virtue of the powers and authorities in me vested by law I do hereby proclaim, declare and make known that, from and after the date hereof, the ports of entry enumerated in the Schedule hereto shall be the sole ports of entry on the Cape Province-Natal Border for the admission into that Province from Natal, in the manner described in such Schedule, of human beings, live stock and the articles or things specified in regard to each port respectively.

And I do hereby further declare that, notwithstanding anything to the contrary, contained in Cape Proclamation No. 187 of 1899, as amended by Proclamations Nos. 428 of 1908 and 89 of 1910, it shall not be lawful for any person, without the authority of the Minister previously obtained, to pass through or over any of the fences erected along the Natal Border from the Drakensbergen to the mouth of the Umzimvuna River, except through the ports of entry enumerated in the Schedule hereto or over a stile, and in the latter case, only for the sole purpose of procuring water from the Ingwangwane, Indowana, Umzimkulu, or Umzimvuna Rivers, and further, that all persons crossing such stile or entering through the ports of entry as aforesaid, shall be liable, when so required by the officer or non-commissioned officer in charge of the Cape Mounted Riflemen or Guard acting under his orders, to be searched and examined for the possession of any article or thing, the introduction whereof into the Cape Province from Natal is, or may hereafter be specially prohibited. Any person contravening the provisions of this Proclamation shall be liable, on conviction, to a fine not exceeding fifty pounds, or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months, unless such fine be sooner paid. Cape Proclamation No. 102 of 1910 is hereby cancelled and repealed."

SCHEDULE TO THE FOREGOING PROCLAMATION.—*Ports of Entry into East Griqualand:* Stanford's Drift, Union Bridge, Ingeli Gate.—For (a) human beings; (b) equines, provided they are accompanied by a certificate issued and signed on a date not more than fourteen days previous to their introduction, by a Natal Government Veterinary Surgeon, to the effect that they are free from any symptoms of contagious or infectious disease; (c) sheep and goats, subject to the provisions of Proclamation (Cape) No. 485 of 1909; (d) pigs; (e) dogs; and (f) all articles or things whereof the introduction is not specially prohibited. *Riverside, Harding Gate.*—For (a) human beings; (b) equines, on compliance with the aforesaid proviso; (c) pigs; (d) dogs; and (e) all articles or things whereof the introduction is not specially prohibited. *Into Pondoland.*—Webster's Drift.—For mail bags only under the supervision of the Border Guard. N.B.—Prohibited articles or things comprise animal produce, grass, hay, reeds, rushes, herbs, plants, or other vegetable matter, but do not include vegetables, fruit, cereals or cultivated plants, provided such are not packed in grass, hay, reeds, rushes or moss.

Home-made Cheese.

An American lady describes in an exchange how home-made cheese of good quality may be made. Six gallons of fresh milk, she says, will make nearly 5 lb.; one rennet-tablet will curd 100 gallons of milk; one cheese colour-tablet will colour 500 lb. of milk (8 lb. to the gallon). Heat the milk to 86 deg., dissolve the colour, add to the milk. Stir constantly. Dissolve the rennet in one half-pint of boiling water. Add to the milk and keep stirring two or three minutes, then set it on the back of the stove until the whey rises. Take a short knife and cut into $\frac{1}{2}$ -in. squares. Let the whey rise a few inches, then drain off all you can. Put the curd back on the stove, heat to 100 deg., stirring and breaking in tiny pieces with the hands. Add three teaspoons of salt and stir until the curd is very tough. Pour off the whey, put in a mould, press for several hours. Remove from the mould, line the bottom and sides with cheese-cloth, put the cheese back into the mould and put very heavy weights on it for twelve hours or longer. Take out of the mould, rub with butter, put in an even temperature, turn every day, and rub well with butter to prevent moulding. It will mature in three or four weeks, "and is equal to the best cheese we buy." To make cream-cheese use one-fourth cream.

Expansion of the Wool Industry.

One of the most marked features of farming progress in South Africa during recent years has been the well-sustained increase in the production of wool; each year sees an increase, and the latest figures show that the production of Natal alone has passed the two million pounds mark. This

continued increase is naturally resulting in an expansion of trade in wool at Durban, where there are now quite a number of brokers doing a heavy business each season. Messrs. Reid & Acutt's Wool Mart, Ltd., have prepared a very useful pamphlet dealing with the industry and encouraging growers to give increased attention to the production of wool of better quality and to the sorting of their wool before marketing—a review of which pamphlet will be found elsewhere in the present issue—and they have extensive and up-to-date premises for handling the large quantities of wool, mohair, hides, skins, wattles bark, etc., in which they do a big trade; and we have now received news of the erection by another large and enterprising firm of brokers—Messrs. Shaw Bros., of Durban—of a large and modern wool warehouse, which they have provided in order to cope with the continually increasing trade in wool, etc. We give an illustration of this warehouse on the opposite page.

These premises are situated on the Esplanade, Durban, and were designed by Messrs. Street-Wilson & Paton, and consist of two stories 200 feet in length by 85 feet in width. The upper floor, which will accommodate 1,500 bales lotted for sale, is reserved solely for the purpose of exhibiting wool to the view of buyers. The roof, which, we understand, is the only one of its kind at present in Durban, is designed specially with a view to obtaining the very best lighting results, and is similar in every respect to the roofs covering the wool warehouses in Bradford, Sydney, and other large wool centres where the value of good light is considered to be of the first importance. The building is ceiled with $\frac{1}{2}$ inch boards and covered with ruberoid, thus ensuring a cool and even temperature throughout the year. The convenience of the buyers has been studied by the provision of a large well ventilated sale room 40 feet by 20 feet. We congratulate Messrs. Shaw Brothers on their energy and enterprise, and trust their foresight in providing for the future expansion of the trade in which they hold an important position will meet with its due reward.

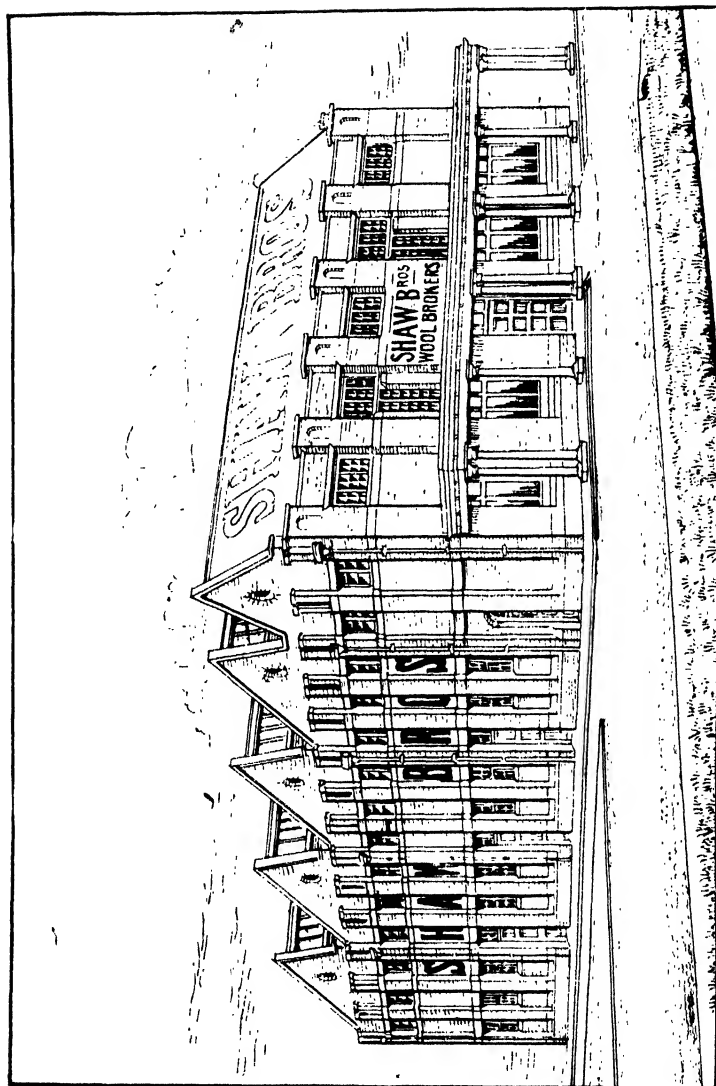
Ramie "Wool."

Up to the present time ramie has only been treated in the mills which import it for the production of long silky filasse, but a new development has occurred in connection with the utilisation of this fibre which gives promise of proving of great moment to planters as well as to the owners of factories. This news we glean from the April number of the *Indian Agriculturist*, which further states that the invention involved is that of Mr. Robert G. Orr, of 708, Finsbury House, Finsbury Circus, London; and it appears that by means of this invention ramie fibre can be so treated upon the fields where it is grown that it becomes an entirely new product, one which is completely different from any material hitherto

produced by machine or chemical process from the fibre-yielding bark of the plant. This is a soft fibre which Mr. Orr terms "processed ramie," which can be shipped by the planter to the manufacturer, who can then by simply passing it through a carding machine obtain ramie "wool" which felts, and is spinnable at once. This product mixes admirably with cotton, sheep's wool, etc. The process can be worked by any planter with the aid of any coolie labour at his command, and it requires no chemical skill. The process itself requires no chemicals whatever, and the machinery employed is somewhat of the nature of scutching machinery.

Samples of the material have been shown in London and have been pronounced to be valuable as a wool, and the inventor has had it spun into yarn and woven mixed with natural wool, wool rags, and waste wool and flock. The woven materials look well, have dyed successfully, and make a strong warm cloth suitable for many purposes. Mr. Orr has improved upon his original patent, and he estimates the cost of the treatment of a ton of dried ramie canes by his process would not exceed in India Rs. 5 per ton in addition to that of passing through his scutching machine, which he states would be only small, but he says it would not amount to more than Rs. 7—8 per ton, and it will, it is claimed, extract more ramie from the canes than any other process for treating the fibre.

Mr. Orr points out that hitherto the decortication of ramie has been one of the great obstacles to its being turned to account profitably by planters and manufacturers the world over, the cost of this by either hand process, or machine, not showing the majority of planters at the present time profits which satisfy them, and the difficulties attending the former making the crop, in India especially, not popular; his process is however exceedingly simple, the operation on the canes of the same not representing anything like the same difficulties or trouble attending the production of China grass, ribbons, or machine decorticated fibre for degumming and weaving into ramie linen; notwithstanding these latter, however, a new mill for the degumming and wearing of ramie linen has been erected at Kirkstall, near Leeds, Yorkshire, by Messrs. P. A. Aykroyd and Co., which brings the number of English ramie mills up to five. The new mill produces a good strong yarn from the fibre, and their quotations are slightly lower than those asked by other firms for the same counts of yarn. The value of this new ramie product lies in the fact of the far greater strength which the material possesses to any rags (flock), or waste wool, which is used by the woollen manufacturer, and by making use of it in the place of this he will be able to produce far superior cloths, and ones which will command better prices at less cost for manufacture. We further learn that this new process is ready to be set in active operation in ramie-growing areas.



MESSRS. SHAW BROS.' NEW ESTABLISHMENT AT DURBAN.

Mealie Grubs.

By CLAUDE FULLER, F.E.S.,

Chief, Division of Entomology and Horticulture, Natal.

Of the insect-pests of the growing maize-plant in this country, those whose depredations are most conspicuous are three moth caterpillars. These pests, popularly called "grubs" or "worms," represent the early stages of three distinctly different moths; and, whilst all attack the one host-plant, in their life-cycles and habits there are many important differences. In one respect, however, there is a happy coincidence, and it is that by the resolute adoption of improved farming methods all are equally brought under control.

Maize culture to-day, chiefly because of improved machinery, shows a great advance upon what it was ten years ago: methods which were then deemed impracticable are now, if not generally adopted, quite common practice. The methods which will go so far towards mitigating these pests aim, so far as one can make out, at obtaining the fullest value from the maize plant, at soil improvement and for cultural facilities.

Speaking generally, it frequently happens that agricultural methods are the only means of controlling the pests of field crops; such are Clean Culture, Crop Rotation, Modifying the Time of Planting, and the Use of Food-plants as Traps. To understand and appreciate the application of these measures and to see how far the thoroughness of their adoption affects the result, one must also be conversant with the habits and the round of life exhibited by the insects themselves.

Before passing to the consideration of our several Mealie Grubs it will not be out of place to examine these agricultural methods.

Here, the following concise resume, given by that excellent authority, C. M. Weed, will not be out of place:—

Clean Culture.—There is probably no one general method by which the farmer can do more to protect his crops from insect injury than by Clean Culture. A large proportion of injurious insects pass the winter under rubbish of many sorts, the burning of which late in Autumn will tend to their destruction. If the rubbish is not allowed to accumulate such insects will have less chance to find suitable quarters and will be

more likely to perish from the effects of weather. Clean culture also reduces the opportunity of feeding and breeding. "It is a safe rule whenever a crop is gathered, to clear off the remnants and destroy them as completely as possible. This is contrary to the general practice, which is to get the crop and let the remnants take care of themselves until the land is prepared for something else. . . . The rule should be to gather and burn either by fire or in the manure pit with lime." (J. B. Smith.)

Crop Rotation.—By a thoroughgoing system of Crop Rotation the multiplication of many insect pests is effectually prevented. This process may act by starving, as in the case of the Western Corn root worm, an insect which deposits eggs in the cornfields in Autumn, the eggs hatching into worms the following Spring. If then no corn is present the worms perish. Or the process may compel the insect to feed on scattering weeds and grasses, as in the case of the corn root-louse, thus giving a decided check to its powers of multiplication. There are many and cogent reasons for Crop Rotation besides those relating to insects, and good farmers seldom plant a given crop on the same ground for successive years. "Good agriculture is the first and best Insecticide."

Autumn Ploughing.—The injuries of many insects may largely be prevented by fall ploughing. The pests affecting the roots of grasses and grains are largely subject to injury by this method, which exposes them in one stage or another to the attacks of birds and other enemies as well as to the elements and injury by other methods.

Modifying the Time of Planting.—Sometimes insect attack may easily be prevented by planting the crop either earlier or later than the customary time. In such cases a careful study of the limits in either direction may well be made and all possible advantage taken of the facts thus ascertained.

Use of Food Plants as Traps.—A number of insect pests may be best destroyed by planting a favourite food-plant near the crop to be protected: the insects will concentrate upon this and may then be destroyed. A good example of this is found in the practice of sowing mustard between rows of cabbages in order to attract the harlequin bug to the former, where it may be destroyed and the cabbages thus protected.

With this digression we may now discuss the habits and role of the several insects in question, returning later to consider the application of the farming practices and agricultural methods enumerated above, to their control.

The most important of the three is *The Mealie Grub* or *Top-worm*, for which the more applicable name of "*Maize-stalk Borer*" has been suggested by Mally. This pest is quite widespread throughout South Africa, being notorious for its injury to the centre of young maize plants.



Fig. 1. - Adult or Moth of the Maize-Stalk Borer with wings slightly expanded. (*Much enlarged.*)

Its damage is practically confined to Maize (Mealies), Kafir Corn (Ama-bele), and Sorghum (Imphe). It is quite capable of attacking other large grains such as Teosinthe and thick-stemmed grasses, and has been found in Sugar-cane. This latter plant must, however, be regarded as a most unusual host, because sugar-cane is not attacked by the grub in Natal sufficiently to have drawn planters' attention to it.

Second in abundance and distribution is a striped caterpillar of variable colour. This insect is famous as the Cotton Boll Worm, but is referred to here as the Striped Beard Grub, because it commonly destroys the Beard of the mealie, upon the threads of which its eggs are laid.

The actual eating away of the beard is as a rule accomplished too late to affect the formation of the grain, and so does not constitute a serious injury. The real damage occurs through the caterpillar working into the cob, destroying the grains at the apex, and tunnelling down

Plate 1.



An old Mealie Stump showing the over-winter Caterpillar sheltering in the base.
x x protective plugs placed in the channel by the Caterpillar for its better protection.

(See Article by Mr. Claude Fuller)

between the rows of grain; an injury seriously intensified by the action of moulds and bacteria.

The third pest is one which, whilst not frequent in its attack upon mealie fields, has, upon occasion, accomplished vast mischief. This is the Cut-worm: the Mest-worm of the Boer, so called because its presence is erroneously attributed to manuring the lands with dung. These caterpillars might almost be said to be black in colour; they live in the soil during the daytime, coming out and travelling over the surface at night to commit their well-known depredations.

THE MAIZE STALK-BORER.

There can be little doubt about this insect being a native of South or Central Africa, and it was probably well established in Amabele and Imphe long before mealies were cultivated in Africa. Its present position as an important insect pest is entirely due to two factors. First, the extensive culture of its favourite and nutritious host-plant safeguards and increases its reproduction by giving greater opportunities for the parent moth to lay its eggs, by providing a sufficiency of food for all the young hatching from such eggs, and further the maize plant by its very robustness gives the insect passive protection from its natural enemies. Second, the common practice of leaving the stalks standing in the fields right through the winter and spring furnishes every facility, coupled with the greatest natural protection, for the insect to pass safely through its most vulnerable stage. In short, the practice of leaving maize stalks standing in the fields until the next ploughing season is the most scientific way of breeding this particular mealie-grub that could be devised.

Throughout the winter and early spring the caterpillars rest in cavities in the stalks and stumps of Maize, Kafir Corn or Sorghum, as the case may be (Plate i.) without feeding. Later, towards the end of September, as a general rule, they transform into pupæ or chrysalides and can be found as such during October. Neither caterpillars nor pupæ are ever found in the soil, and if hybernating caterpillars are taken from a mealie stalk they will, if opportunity occurs, bore their way into another, or else perish. The moths emerge during the second and third weeks of November, soon depositing their eggs upon any young maize, Kafir corn, or sorghum plants they may discover.

The transformation of the caterpillar to the moth is, of course, influenced by varying climatic conditions, but it is not possible at present to fix the dates for a given locality even. Moths have, for example, emerged as early as the 2nd of November, and pupæ have been found as late as the 29th of November. Last season over-winter caterpillars were taken as late as 23rd November, whilst at the same time moths from the same brood were already on the wing. It is, however, perfectly safe to

assume that until the end of September the over-wintered insects are still in a pre-adult condition.

The eggs deposited upon young plants have been found laid in clusters under the leaf-sheaths (see figure ii.), large numbers being usually laid upon a single plant. The eggs hatch out within 6 to 8 days, and the young caterpillars at once begin their attack. With so many at work upon one plant a shortage of food supplies naturally becomes imminent, and to avoid any such contingency most of the brood instinctively migrate, under the cover of darkness, the surrounding plants. These emigrant caterpillars bore their way into the new host plant near the base and travel up through the core. This migration is the cause of very serious damage, each caterpillar being well grown is able to entirely destroy the plant it invades. Upon reference to figure iii. B, which illustrates a section of a young maize plant, it will be seen that hidden away in the core of the leaf-sheaths is the "growing-point," in the apex of which is the embryo tassel (T) and cob (C). In the sketch A of the same figure is shown the tunnel of the invading caterpillar, from which it is seen that not only are bases of the central leaf-sheaths cut away so as to cause the death of the centre or "top," but the living heart of the plant has also been removed, and unless it "ratoons" all possibility of its growing to maturity is removed.



Fig. II.—Portion of young mealie stalk. The arrow indicates where the eggs are laid under leaf-stalks. Also a group of eggs much enlarged (from Mally).

The caterpillars from the eggs laid in the spring are usually full-grown about the first week in January, and, after undergoing the transformation to pupæ, emerge as moths a fortnight or so later. That at times this occurs sooner is evidenced by the emergence of moths as early as the 6th of January. These are called moths of the second brood to distinguish them from their immediate progenitors. Their eggs are laid upon the now well-grown plants and the caterpillars feed to full-growth within the stems, reaching that stage in time to meet the long period of fasting with which they are faced. The second brood of caterpillars undoubtedly do a vast deal of damage by destroying the interior of the stems, an amount of damage overlooked and forgiven them even by the very man who sets more than ordinary store upon the value of old

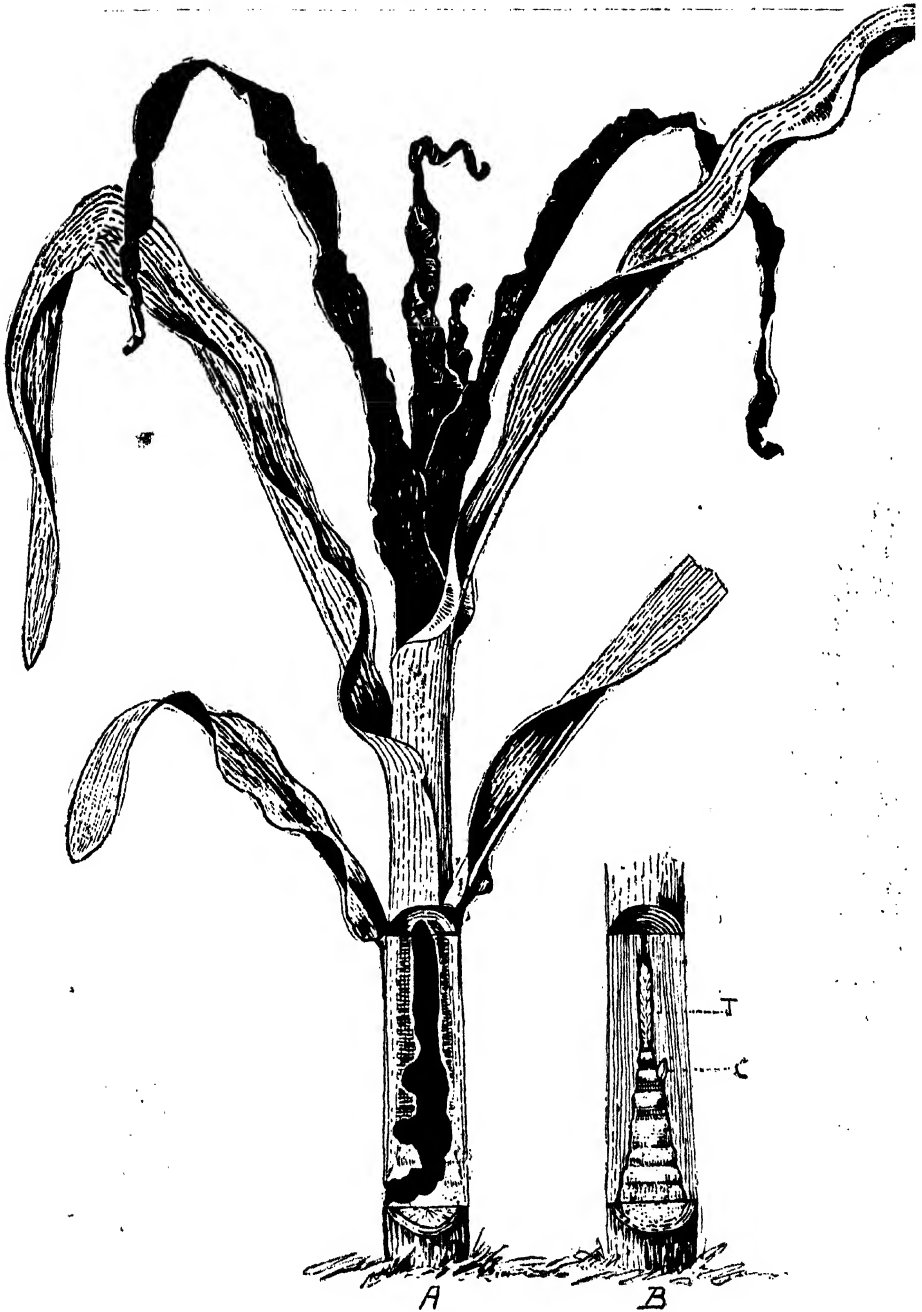


Fig. III.—A Young Mealie Plant showing the characteristic dead "top."—The lower part of the plant is seen in section and shows how an immigrant caterpillar has entered the base and destroyed the growing "heart." B a section of a young mealie plant for comparison with A, showing T the future tassel and C the future cob. The joints of the future plant can also be seen in formation.

weather-beaten mealie-stalks as winter feed for his stock. From the casual point of view, the second brood does not do the harm that the first does to the particular crop, but, seeing that its immediate descendants are the harbingers of the evil of the following summer, this is really the destructive stage of the Maize-stalk Borer.

Whatever the variations may be in the emergence of the early summer and second brood moths, or whether or no in some parts there are even three broods—there are always two—is insignificant to the farmer compared with the fact that throughout June, July, August and September—a full third of the year—this particular enemy of his is absolutely and easily at his mercy. There, for the present, we may leave it.

THE STRIPED BEARD GRUB.

This insect is found practically all over the world, and its potentialities for mischief are of no mean order. As a caterpillar it feeds upon a great variety of plants, favouring here the bolls of cotton, the pods of peas, the cobs of corn, and the seed-heads of the annabede.

Not infrequently it is green and strongly striped with brown. In the beard of the maize it may be brown, green or reddish, and, hidden in the cob, examples are often found of a pale flesh colour. In the heads of the Kafir-corn it is frequently red, favouring the colour of its food. There are several broods of caterpillars during the summer, of which some overlapping seems to occur; however, the chief point of interest and importance which the life-history of this pest presents is that the grubs enter the soil to pupate, and in this condition pass the winter ensconced in little earthen cells within a few inches of the soil's surface. In this respect the insect differs essentially from the stalk borer, which, as we have seen, hibernates as a caterpillar within the stem of its host-plant. But, as with the one so with the other, the most vulnerable stage in which we find it is whilst in its winter quarters.

CUT-WORMS.

There is perhaps no more distressing form of insect attack than the ruthless destruction of young plants, carried out under the cover of darkness, by cutworms. Every gardener knows this pest, for there are few plants that come amiss to it, be they valued for their beauty or their use. Like the two before-mentioned pests, these are moth caterpillars which lie hidden in the soil all day, issuing at night—for the better protection from their enemies—to travel from plant to plant over the ground. Their chief depredations are to young tobacco, tomato, cabbage, and the like, and to potatoes. How capable they are of most extensive mischief is illustrated by the occasional devastation wrought in mealie fields, in one instance on record 40 out of 50 acres being destroyed.

Plat. 11



ADULT OR MOTH OF THE CUT-WORM.

(See Article by Mr. Claude Fuller.)

Sometimes nothing but the stump of the plant remains; often it is just cut off and left to wilt and die in the morning sun; perchance, however, one may find the tips of a few leaves showing out of the soil. Scrape away the soil carefully and here a cutworm will be found, coiled up to show offence at being disturbed in this underground lair whither it has retired to finish off the night's spoil at leisure.

The worst of it is one never knows when cut-worms are going to put in a destructive appearance, and the question is asked: How do they get there: they are quite big and the land was clean when it was planted, they must have fed somewhere and on something else before.

That is so, the creatures were there all the time. Every farmer has noticed that cut-worms are never bad in newly turned veld, only in old lands. This is because the moth laid its eggs and the young worms make some growth upon previously existing vegetation. Cut-worms can live for quite a time without food, and many kinds pass through the winter, resting as partly-grown caterpillars. Some may pass the winter as pupæ, as does the Beard grub. Cut-worm attack may, therefore, originate from caterpillars which have arrived at a partly-grown stage upon the weeds and grass of the previous autumn and have starved through the winter, or, upon the other hand, from eggs laid upon the weeds and grasses which spring up and flourish in the spring, enduring a short starvation period between ploughing time and the advent of the young plants, either from sown seed or when set out from seed beds.

MEASURES OF CONTROL, ETC.

As these notes are written for the maize grower, the measures of control are best discussed from his standpoint, which brings us back to the question of methods of modern maize culture and agricultural methods generally with which this note was introduced. Other methods of dealing with these pests will also be touched upon.

According to the common farm practice which obtains the maize plant is grown only for the crop of seed it produces—incidentally the remnants have a value as winter feed and what is left is turned into the soil to replace in the form of vegetable matter some of the constituents it has been deprived of. We have seen that by this practice the Mealie Grub is propagated from year to year and the bulk of the mealie stalks are hollowed out by this insect, upon which score alone their value is materially reduced.

The question which at once presents itself is—if the mealie plants, after the removal of the cob, have a certain feeding value, in what way can they be better conserved for that purpose than by being left to weather in the open; and, if the remnants have a certain manurial value, can that be returned to the soil in any better way than at present obtains?

The answer to this question is found in harvesting and stooking the crop; that is, in cutting the ripening mealie stalks with the cobs still upon them and building them into upright stooks or stacks to cure. By this method the farmer can reap the entire crop, saving the cobs for grain and the stalks and leaves for "stover" or mealie hay, which can be fed more economically to the stock and returned to the land in the best form possible, as kraal manure. The adoption of this excellent farm practice, whereby the greatest return possible is obtained, of itself solves the Stalk Borer problem, it only being necessary to cut the plants close down to the ground with a sharp chopper or cane-knife to effectively remove the winter quarters of the pest. In good farm practice is found the proper means of control of the Stalk Borer, coupled, of course, with clean culture, which now only involves the cleaning up and burning of such stalks and stumps as have been left lying on the lands. In view of the fact that many over-wintering grubs hide in the lowest part of the mealie stem, it is essential that in reaping the cut should be made low down so that any grubs not carried away in the stems are exposed to the influence of the weather and easily accessible to predacious insects and other small animals and parasites.

Such a treatment, of course, does not apply to the Beard-grub or the cut-worm, because they either as pupae or caterpillars hibernate in the soil. The treatment for these pests is clean culture, coupled with autumn or winter ploughing.

Late Sowing.

Farmers have learned by experience that there is the chance of escaping serious damage from the Stalk Borer by planting late. That is, sowing is usually delayed until such time as the moths from over-wintered caterpillars have emerged and died. This is a circumventive measure which, if generally attended by a large amount of success, has many disadvantages. Because seasons vary and the wintering caterpillars transform early or late, as the case may be, Stalk Borer attack always occurs in one degree or another.

Trap Crops.

Mealies that are planted very early (about August) are said to escape the "grub." As a matter of fact such is not the case at all, but the plants are so far forward in growth when the eggs are laid upon them that, as in the case of the ordinary second brood caterpillars, they do not show the effect of the grubs working within the stalks.

Even if it entails some trouble and attention, the planting of strips of early mealies adjacent to the mealie or amabele lands, has much in it to recommend, because it furnishes a further means of circumventing the pest. Such early plantings attract the moths and afford ample facilities for egg-laying. In short, these sowings act as traps, and as

soon as the grubs in the plants are seen to be well advanced in growth the crop should be cut clean, removed from the land and fed at once to stock, preferably being chaffed beforehand.

Poisoning for Top-grub.

This is a treatment learned from the old Boer farmer, who was wont to go through his patch of mealies, kettle in hand, and pouring into the "cups" of each a small quantity of much diluted sheep dip.

If a careful watch is kept upon the mealies, here and there, some will be found throughout the field showing evidence of insect attack. If the centres of these plants are opened out, small slate-coloured caterpillars—sometimes as many as forty—will be found between the leaf-sheaths eating the surface and boring holes through the still folded leaves. By those who adopt the poisoning method this is regarded as the time to get work, and it is a favourite way of dealing with the pest by quite a number of Natal farmers. By various parties success has been claimed for the use of Little's Sheep Dip, Arsenate of Lead, Quibell's Carbolic Dip and even Vaporite dustings.

Little's sheep dip is diluted at the rate of 1 part to 100 parts of water, arsenate of lead is used at the rate of 3 pounds to 100 gallons, and Quibell's at 1 to 100 for very young plants and 1 to 50 for the stronger.

The last-mentioned was used for treating a field of 300 acres last season, and is claimed to have secured a very good stand. Thirty boys were occupied for five days at the task.

To those who are unable to take any measure of protection against the Stalk Borer, poisoning is strongly recommended. Arsenate of Lead is probably the safest to use.

Baiting for Cut-worms.

The use of poisonous bait for cut-worms is a well-recognised measure, and can be adopted both to cure and to prevent their damage; that is, the bait can be put down where the insects are at work and can be used to prevent any injury from them.

It has to be borne in mind that these creatures feed only at night, and, in order that the bait may be as appetising as possible, it should be laid in the evening.

The best results are obtained in the case of field culture. With the turning in of their food the creatures become hungry and will readily attack the bait laid for them.

The poison is prepared as follows:—

Arsenate of Soda	1 lb.
Treacle or Brown Sugar	8 lbs.
Water	10 galls.

Dissolve the poison and treacle or sugar in the water and moisten in this any available green stuff after cutting it up into small pieces, and broadcast well over the land.

A much-recommended cut-worm bait is prepared in the form of a bran mush (not too wet), using 50 lbs. of Bran to 1 pound of Arsenic, Arsenite of Soda or Paris green, and sweetening with a couple of quarts of treacle. This is put down in spoonfuls or scattered broadcast. Upon the whole, bran is not readily available for this purpose, and, although mealie meal can be used as a substitute, such excellent results can be obtained from the use of cut up green-stuff that it is seldom necessary to fall back upon this bait.

Peach Leaf Curl.

By CLAUDE FULLER, F.E.S.

PEACH LEAF CURL is essentially a spring disease and is one of several fungus troubles which have gradually become more general in occurrence and more widely spread during the last ten or twelve years.

This originated in the indiscriminate introduction of foreign fruit trees, and the present state of affairs is largely due to the fact that measures are seldom taken to keep these pests under control.

Almost everyone who complains of them is anxious to do something to effect a "cure." Unfortunately, this group of diseases, which includes Black Spot of the Peach, Shot Hole fungus of the Apricot and Pear Fusiladium, are not curable, and can be controlled only by preventive measures taken in anticipation of their outbreak. It frequently happens, too, that even when these measures are known of they are forgotten until the disease has put in an appearance and reached its destructive stage, so that all hope of controlling it is out of the question for the time being.

That Peach Leaf Curl is a very serious pest may be gauged by the fact that it was estimated to have caused a loss of several millions of dollars annually to peach growers in the United States, prior to the general adoption of preventive treatment. A very full investigation into the cause, nature and treatment demonstrated that it was possible to escape this huge tax almost entirely by proper and timely measures; indeed, it was shown that 95 to 98 per cent. of spring infection can be prevented by a single application of a suitable fungicide.



"LEAF CURL" FUNGUS ON THE NECTARINE.

(*Exoascus deformans*, Eckl.)

(By kind permission of the Transvaal Department of Agriculture.)

While chiefly remarkable as a disease of the peach and nectarine, this fungus attacks both almonds and apricots and Curl has been observed in Natal upon plums. It is very destructive to the foliage, and also invades the young shoots and fruits, the fruit of the apricot and nectarine being very susceptible to injury from it.

Affected peach leaves have a particularly characteristic appearance, being thickened, crumpled, and misshapen; as the disease advances they assume yellowish or roseate hues. The twigs become swollen, distorted, and curved, whilst the fruit is blotched, blistered, and usually falls without maturing.

The peculiar effect, which the term "curl" so aptly describes, is due to the influence of an invading fungus. The vegetative part of this fungus, known as the mycelium, consists of numerous, branching, root-like threads which draw their nourishment from the young cellular tissue of the host plant. From this mat of fungus threads numerous fruit stems, carrying millions of spores or fungus seeds, are pushed out through the skin or cuticle of the leaves, where they may be seen forming a thin coating of white bloom.

It has long been known that the mycelium of the Leaf Curl fungus exists through the winter inactive in the wood of the plant; and, because of this feature little hope was entertained of freeing affected trees. It is now recognised, however, that it is from the millions of spores produced in the summer, rather than from this perennial mycelium, that severe outbreaks occur and that measures of control can be employed with an ease and certainty rarely attained in the treatment of any serious plant disease.

The treatment found to be so successful is the thorough spraying with full strength Bordeaux Mixture one to two weeks before the blossoms open. That is, sometime between the last week of July and the last week of August.

It is, of course, important that the treatment should be repeated each spring, as the absence of the disease one year is no guarantee that it will not occur the next.

Where it is desirable to use Bordeaux Mixture after the fruit has set, it is well to remember that it must only be used at half strength, because it has a very caustic effect upon the foliage of peach, nectarine, apricot, almond and plum. Such sprayings have a good fungicidal effect, but, apart from this, the action of Bordeaux Mixture is such that the assimilative properties of the foliage are greatly increased and the plant invigorated.

In the preparation of Bordeaux Mixture care must be taken to follow exactly the instructions given, and further, only the best ingredients should be used. The bluestone must be of good quality, and agricultural bluestone or any trade substitute must not be used. Imported stone lime should be employed, the local quicklime, besides being inferior, is as often as not a good deal air-slaked before it reaches the farmer. In purchasing small quantities of stone lime it should always be obtained in fairly air-tight tins, and kept so until required for use.

PREPARATION OF BORDEAUX MIXTURE.

Formula.

Bluestone	6 lbs.
Quicklime	6 lbs.
Water	50 gallons.

Slake the quicklime in a cask or wooden tub, starting it with hot water. When thoroughly slaked, dilute to 25 gallons. Dissolve the bluestone in a similar receptacle, *i.e.*, wooden tub, for the solution will rapidly corrode metals and be spoilt for the purpose in view. It is preferable to dissolve the bluestone in cold water. The receptacle should hold 25 gallons, and that quantity of water being put in, a stick is placed across the top, and from this is suspended in the water, a bag made of sacking, containing the 6 lbs. of bluestone. If this is arranged overnight, the bluestone will be thoroughly dissolved next morning.

The mixture is then prepared by pouring simultaneously the lime-milk and bluestone solutions into a third receptacle, say a 60-gallon cask. If the 25-gallon receptacles are too heavy, a beginning can be made by using two equal sized wooden buckets.

For trees in foliage it is necessary to alter the strength of the Bordeaux Mixture according to the following formula:—

Bluestone	3 lbs.
Quicklime	6 lbs.
Water	50 gallons.

The first spraying should be applied after the fruit has well set, October to November, and the second a month later.

Should the spray discolour the fruit, it would be better towards the time of ripening to use a colourless spray, and one can be prepared as follows:—

Carbonate of Copper	3 ozs.
Liquid Ammonia (strongest)	1 quart.
Water	22 gallons.

The carbonate of copper and ammonia are mixed together, and when the chemical action subsides, the water is added.

Selection and Judging of Maize.

By M. J. JOUBERT, B.S.A.

A Paper read at the Annual Meeting of the Orange Free State Agricultural Judges' Association.

WHEN I was asked to give a lecture on the selecting and judging of maize I naturally felt the difficulty of dealing with such an important subject in the time allotted.

We will, however, try to deal with the subject as concisely as possible.

At present each farmer has his own method of selection. The same is also true as to selecting ears for exhibition. In looking over the exhibits of maize at the various shows it can easily be seen that the larger ear is always selected in preference to a smaller ear, even if the smaller ear is superior in other points.

Size should be taken into consideration, but other points, such as shape of ear, straightness of rows, filling of butt and tips, space between rows, and uniformity of ears, are equally as important.

So long as the exhibitor selects ears to please the eye or the producer of seed looks for quantity not quality so long will there be complaints and dissatisfaction as to the awards made at shows, and the resulting crop from such cobs will be more apt to degenerate than improve.

To avoid confusion it will be better to deal with this subject under two heads: (*a*) selection, and (*b*) breeding.

SELECTION

is the basis of all improvement. By selection we assist nature in her work and hasten the ultimate outcome which otherwise would take a number of years.

If it is true that by selection we are assisting and not working against nature, due regard should also be paid to her laws, viz.:—

The law of variation, and

The law of like begets like.

Although these two laws are diametrically opposed, they are the foundation of all improvement.

In the first law we have an unlimited field for selection and improvement, provided proper care is taken that no foreign material enters the breeding plot, as it is likely to throw the work of improvement back for a number of years.

After a type has been established the work of selection is comparatively easy and we know that nature's law "like begets like" will assist us in maintaining that excellence of standard we have been aiming at.

Before the work of selection can be done with any appreciable advantage the breeder should:

- (1) Be thoroughly acquainted with the existing conditions on his farm.
- (2) Be thoroughly familiar with the existing varieties and strains of maize.
- (3) Have a clear and well-defined plan of action, and have some ideal constantly before him.
- (4) Have good foundation stock, that is the variety or strain from which subsequent selections are to be made. It should at least be pure and as uniform as possible.

BREEDING.

The following plan may be adopted if it is desired to breed or select maize in a systematic way:—

The breeding plot should be at least 300 yards from any other variety. When the crop is ripe the best ears from the best plants are selected for next year's breeding plot. The bulk of the crop can be used as seed for the general crop the next year. The following year the same routine of work is carried on; the best ears are selected for the following year's breeding plot and the bulk of crop is used as seed for the general crop. The process is repeated each year.

In Canada there is a Seed Growers' Association. After five years continued selection as described above, the committee gives a pedigree for the seed, the same as the Stud Breeders' Association allows stock to be transferred from the Auxiliary to the Stud Book proper after they had been registered three years.

The question arises whether it is not time for us to form such an association now. From a strictly scientific point of view the procedure as described above is not the quickest and surest way, yet it is the simplest and cheapest course for the farmer to follow.

The advantages of such an association is evident. The breeder will be fully compensated for the extra labour, because when once this seed is known it will be in great demand.

After all there will not be such a lot of labour connected with it.

Many farmers now select their own seed. The only difference will be that instead of selecting from the general crop the breeder concentrates his energies to one or two morgens. The result will be that after five years the crop from the whole of that area will be pedigreed or highbred seed.

How to proceed and the points to be taken into consideration in selection will be dealt with under the second heading, *viz.*:

JUDGING.

In dealing with this we are at once confronted with the difficulty of judging shelled maize. Maize is better judged on cob than when shelled. If we take an ear of maize we can at once see how much breeding is in that ear.

The score card is thus only of use when the grain is on the cob, and Agricultural Societies should encourage the exhibition of maize on cobs. Farmers should also insist upon buying their seed maize on the cob.

We will therefore only deal with maize on the cob.

For convenience sake we will divide the score card under three sub-heads:

- (1) Breed characters.
- (2) Yield.
- (3) Vitality.

(1) Breed characters, *i.e.* (a) form and size of each individual ear, it should be true to type. Uniformity of ears and kernels. All the ears should be as uniform as possible. (b) Unless special attention is paid to uniformity it will be impossible to establish a type. (c) Colour of grain and cob. The grain should always be bright. Yellow grain should have yellow or red cobs and white grain white cobs.

(2) Yield. The yield depends upon the form of ear, filling of tips and butts, shape and depth of kernels.

The space between the rows and kernels are dependent upon the shape and depth of the kernels. If the kernels are deep and wedge-shaped the rows will be close together and the kernels well fitted in.

(3) Vitality. As a general rule our maize matures well and there is very little danger of buying seed unless imported that is low in vitality.

Numerous questions were put to and answered by Mr. Joubert at the conclusion of the lecture.

When a pair of horses become accustomed to working together, do not keep changing around and breaking up the team. It is hard on the horses and hard on the driver.

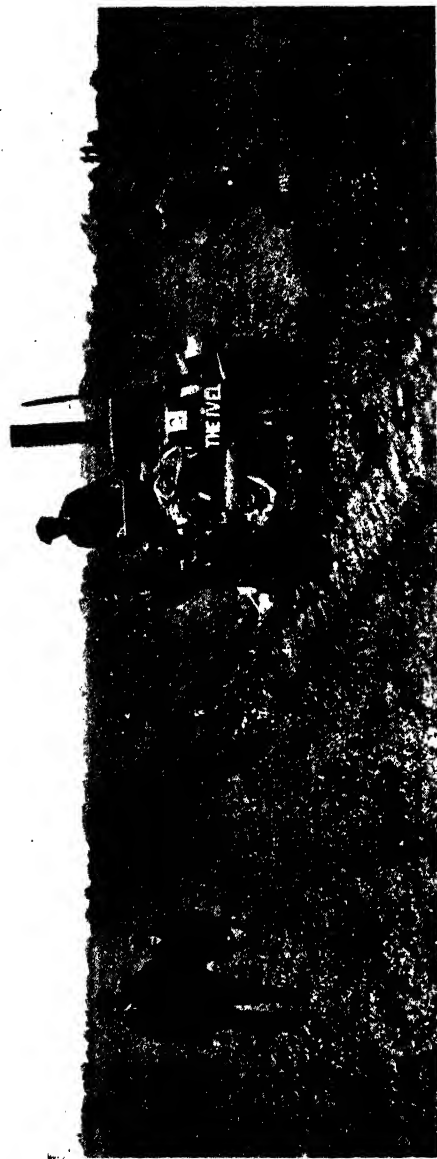
By careful observation you can determine whether the crop you have been growing on our land is adapted to it or not. If it is not, plant a crop that is adapted to it. Much time and money is wasted in trying to grow crops that are not adapted to the soil.

Motors In Agriculture.

By LOUDON M. DOUGLAS, F.R.S.E.

WHILE much interest is being directed at the present moment to motors for aviation, there is an equally great interest attached to the application of similar mechanical appliances to the ploughing of the soil, and it has been recognised that, in so far as the United Kingdom is concerned, success in agriculture depends on the cheapening of the cost of the various operations. This apparently means, to begin with, the elimination of the horse. Amongst the first to recognise this were the members of the Highland Society of Scotland, who, as far back as 1896, at the Perth Show in that year, offered a reward for motors designed for field work. Subsequently in 1904 awards were again offered, and in the interval such progress appeared to have been made in the construction of agricultural motors that it became evident that a permanent class would have to be created for them at all the great shows. Historically, the introduction of the agricultural motors in England is only of recent date, as it was in 1904 that the Royal Agricultural Society of England offered a silver medal for these appliances, and since that time there have been several competitions in connection with small agricultural societies in different parts of the country.

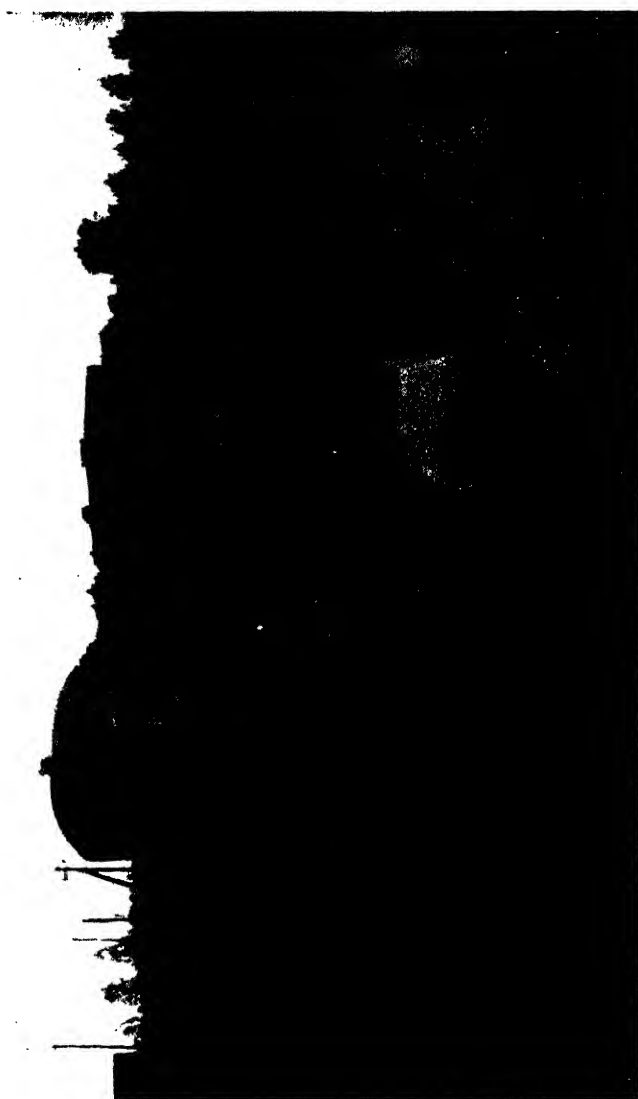
It is not, therefore, surprising that the Royal Agricultural Society of England should offer a gold medal during the present year for the agricultural motor judged to be the best during the actual trials to be carried out on the land, and at the Show held at Liverpool in June there was a considerable entry in connection with this class, it being understood that the actual trials would be carried out later on in the year. These actually commenced on August 9th, at Manor Farm, Baldock, Hertfordshire, England, when there were present about 300 spectators from various parts of the United Kingdom. In addition to the Secretary of the Society, Mr. M. C. Row, there were several members of Council present, *viz.*, Mr. Christopher Middleton, Mr. J. L. Luddington, and Mr. W. A. May, the steward in charge, Mr. C. M. S. Pilkington, who was ably assisted by Mr. William H. Hogg, superintendent of the Society's experimental farm at Woburn. The judges were Mr. Worthy Beaumont and Mr. Baynton Hippeersley. There were also present a representative of the Board of Trade, and Mr. M. Jameson, from the Department of Agriculture of Ireland.



MOTORS IN AGRICULTURE.-I.

In England much attention has recently been given to Agricultural Motors, and the trials carried out by the Royal Agricultural Society of England have aroused considerable interest. The illustration shows a petrol motor at work on the farm where trials were carried out.

(See Article by Mr. London M. Douglas.)



MOTORS IN AGRICULTURE.—II.

Steam-driven 25-30 B.H.P. Sanderson Motor.
(See Article by Mr. London M. Douglas)

Unfortunately the weather was most unfavourable, rain falling heavily at intervals, and so interfering with the pleasure of the spectators. It was originally understood that the trials would be completed in one or two days, but it became evident during the progress of events the first day that this would be impossible, and they would more likely extend to a week at least. As a consequence of this the awards will not be available for some considerable time, it being the intention not to make awards for separate operations, but to take the aggregate of the results.

THE ENTRIES.

For the purpose of the trials an agricultural motor could be any kind of motor using steam, oil, petrol, or electricity as its motive power, and had to be capable of (1) hauling direct in working a plough, cultivator, harvester, or other agricultural implement; (2) driving such an agricultural machine as a threshing machine, chaff-cutter, or grist mill; (3) hauling a load along a road and on the land. Special regard would be had in the judging to the weight of the machine, the weight per inch of the wheel, design, construction, and adaptability to various kinds of work, ease in turning and space required, consumption of fuel and other supplies, and the price. Eleven entries were originally received from six different firms, but these were reduced to eight entries from five firms, *viz.*:—

1. The Ivel Agricultural Motors (Limited).—18 to 20 h.-p. single-speed paraffin-driven motor, and an 18 to 20 h.-p. paraffin-driven two-speed motor.

2. J. & H. McLaren—5-ton compound agricultural motor, steam-driven.

3. Mann's Patent Steam Cart and Waggon Company (Limited).—Steam-driven tractor.

4. H. P. Saunderson.—(a) 40 to 50 b.h.-p. universal motor, (b) 25 to 30 b.h.-p. universal motor, (c) 12 to 14 b.h.p. universal motor.

5. Wallis & Stevens (Limited).—Compound steam tractor.

The first day's trials were devoted to ploughing, and at the outset it was decided that it would not be possible for the judges to take more than three machines in the one day, and the first three mentioned were selected—*viz.*, the Ivel motor, 18 to 20 h.-p.; the McLaren 5-ton tractor, and Mann's patent steam tractor. The trials consisted of ploughing five acres of fed-off clover land, the ploughs used being of the three-furrow type, and made by Messrs. Howard, of Bedford.

The soil of the field is of medium texture, and, although considerable rain had fallen, it was noticeable that the furrow slices, which were

five inches deep and ten inches broad on the average, turned up quite dry; the moisture, in fact, had not percolated more than an inch. The three motors did splendid work, and the general speed attained was very great, the M'Laren tractor especially calling forth many exclamations of wonder at the quickness of its pace. That feature, however, is only one of these which will enter into the final judgment, and obviously that cannot be arrived at until the trials are completed. The first day's contest was one between petrol and steam, and it was generally agreed that the handy size and weight of the petrol motor were commendable from the agriculturist's point of view, but the vibration as compared with the steam machines was very great, and might have a telling effect on the life of the motor.*

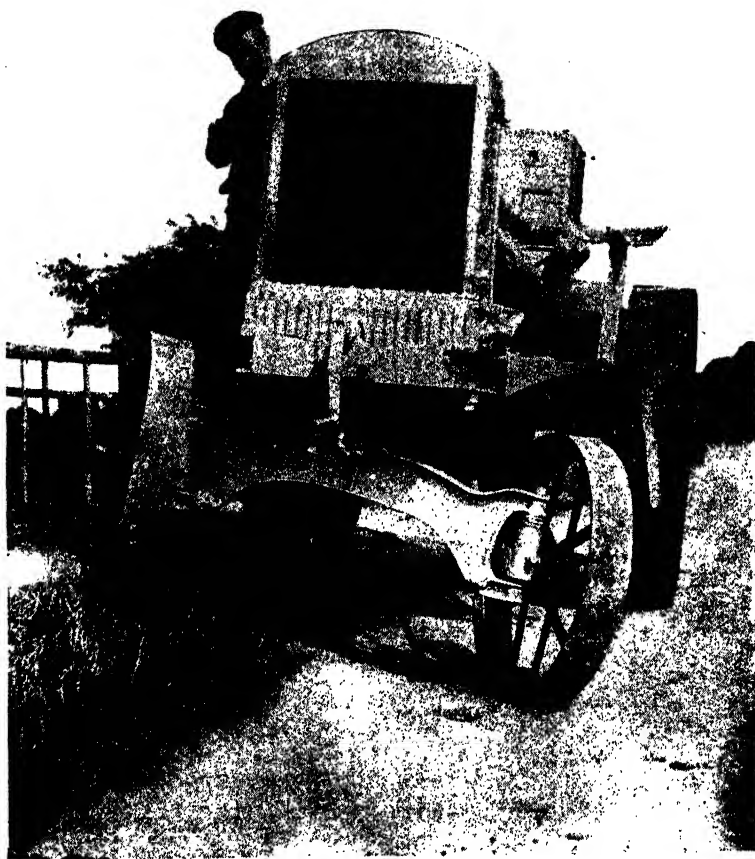
The arduous work set out for the competing machines became apparent on the second day, when, after the ploughing tests were completed, the brake tests were commenced. These were primarily designed so as to determine the amount of horse power produced by each machine, and such as would be available to drive a threshing machine or any other appliance where motive power might be necessary. Each machine, therefore, worked upon a brake, the power absorbed being estimated by a dynamometer. This was the only part of the trials which did not appeal to the general agriculturist, who preferred to see the machines actually at work on the land. But the brake trials were only a part of the whole programme.

The next test was upon the cutting of corn, and it must be admitted that the work was accomplished in splendid style. These tests were followed by road traction trials, each motor being required to draw a load along a 25-mile tract. Deep ploughing was then engaged in, and this trial brought the programme to a conclusion after six days continuous hard work. All the motors kept in their place until the end, so that a fair comparison could be made, which resulted in the gold medal of the Society being awarded to the M'Laren 5-ton steam tractor.

Petrol did not, therefore, on this occasion displace steam, and there can be no doubt that the award was in accord with the general view of the spectators. At the same time, opinions were freely expressed that none of the competing machines conformed exactly to the ideal machine wanted, inasmuch as the steam tractors were too heavy, and the petrol motors too light.

There is room for great improvement in these motors, and doubtless, now that the matter has been so prominently brought to the notice of agricultural engineers, there will be many efforts made to improve upon the good work already done.

* Adapted by the Author from Article contributed by him to *The Scotsman*, Edinburgh.



MOTORS IN AGRICULTURE.—III.

End view of 50 B.H.P. Sanderson Motor, shown the Condenser and Swivel Front Attachment.

(See Article by Mr. Loudon M. Douglas.)



MOTORS IN AGRICULTURE.--IV.

A Steam-driven Motor hauling a three-furrow plough at the recent motor trials conducted by the Royal Agricultural Society of England.

(See Article by Mr. London M. Douglas.)

The Living Bee.

By MARY RITCHIE,

President, Natal Bee-Keepers' Association; Natal Expert, South African Bee-Keepers' Association.

(Continued from Page 345.)

THE SWISS CHALET.



"It is much too steep," said the drill mistress who had gone up to report, "and the second roof is steeper than the first." We were standing on the first roof, she and I, at the bottom of the longer ladder which led to the roof in which the bees were lodged. She had just ventured to the top of the second ladder, and this was her report. The bee-class standing "booted and spurred," otherwise "gloved and veiled," below, were decidedly disappointed, but as we could not re-make the roof, we resigned ourselves and came down.

To allow the bees to be destroyed by tar or sulphur was out of the question; we must do something. The Kafir boys had been elaborately arraying themselves in mosquito netting, and now they stood enveloped from head to heel, only their dark toes visible. We had intended them as a reserve. It was useless their going alone. They had been the day before, hence the desire for plenty mosquito netting! At last a white workman was induced to venture, and, rendered bee-proof in veil and gloves with a smoker going gaily, he took the lead. Very reluctantly the girls surrendered the bucket and the rope, the bee spoons and the knife. You must cut out the combs, put the bees in the bucket, fix the rope to the chimney and swing them down, they said. "I wish we could have gone," they sighed, "but at any rate we won't have them sulphured."

Too young to be depressed for more than half a second, the next instant brought the request "may we climb up the gum tree and watch?"

"There are no lower branches, it would be a stiff climb for a boy, that tree," remarked the politician who was looking on.

But even as he spoke one of them had bent close to the tree and the next had leapt from her shoulder, caught and clutched a bough, and was swaying quite a height from the ground. But only for a moment before she disappeared like a monkey among the foliage. The tree proved an excellent outlook tower from which directions were shouted to the roof. From the ground the Kafirs' shrouded forms and the workman's stooping figure was all that could be seen. Operations seemed slow. There was a good deal of smoke, a considerable amount of hammering, but with no apparent result. Time went on. The class wearied, came down, and adjourned for tea leaving Doris alone giving directions from the tree.

"Do this and do that, remove the upper tile, no, wait, don't hurry, sit still, tell the Kafirs to sit still, let the bees cluster and so on." The man kept asking questions. It appeared that they had clustered quite out of sight and seemed to his amazement to have mysteriously disappeared.

"There are no bees now," I heard him say, "they have all gone."

Such foolishness was too much for Doris. "Duffer!" and she swung herself from the tree, kicked off her shoes in her girlish impulsive way, and announced "I am going on the roof."

But the politician was before her and Clause 129 out of mind for the moment.

"If you are determined to go, let me go first." I was grateful, as with a helping hand, she was practically safe. He conducted her to the bottom of the chimney which was the landing stage of the second roof and bade the workman throw him a rope. Hand over hand she was soon on the ridge. Indeed, she was there before I looked round, for, as I expected, Ina was ordering me to tie her bee-veil quick. "You have let Doris, I am going too." The drill mistress followed to look after both, and now there was quite a little company. A Kafir maid consoled me with tea, but I would rather have been on the roof.

Doris very soon located the bees. The workman moved quietly, keeping pace with her energetic commands. More and more tiles were removed. About half the cluster was ladled into the bucket, when the bees rebelled and the swarming note was heard. The bucket was covered up, the workers sat patiently amid the encircling bees and waited results. It was difficult for a time to say where they had gone, and the bucket was being lowered when one of the juniors noticed a clump of bees under the cornice. There it was impossible to reach from the roof, so, leaving the bucket suspended, the adventurers came down.

The ladder was soon transferred to the upper balcony, and the workman, eager to be equally courageous, leapt from it to one of the ornamental ties, and from there, with the aid of a long ceiling brush, broke up the cluster.

The bees returned to the roof! Obviously the queen was *not* in the bucket.

"Won't you come?" The invitation was irresistible, and I joined the climbers, but felt by no means heroic in following where my pupils had been.

"Are you sure you won't feel giddy?"

"Quite sure."

"Are you safe?"

"Yes, quite safe."

"Isn't Maritzburg lovely?"

"Yes, perfect."

The land on one side slopes away precipitiously and we can see kloof below kloof—a perfect dream of light and colour. Here, the greys and greens of the gum trees, there, the darker fringes of wattle, and far far below on a wide open plain, all encompassed by the hills, the city itself—a veritable fairy Camelot. What funny little dwarfs the people look. The house party are taking seats for the play, and the Kafir girls are placing a line of chairs and what look like scarlet cushions. The politician has a fascinator in his hand, or is it a fan? The juniors are shouting encouragement from the gum tree, the bees are breathing defiance underneath.

"If he takes off any more tiles won't we go down through?"

"Well, who wanted more tiles off? Who kept saying 'take off more tiles,'" and Ina settles herself more squarely on the ridge.

"Yes, it feels," answered the drill mistress, "as if we would go to the very bottom of the earth."

"You are heavy, you will fall far, but isn't your arm aching holding on? Mine is. I had no idea I was so heavy, but I am glad I came."

"Yes, I should think so," from all in chorus, and another bit of plaster is sent rolling down in the laughing hope that a Kafir will be passing underneath. We would not have missed this for anything.

"Oh! another sting—that is nine!"

"Ten."

"Stop it Doris—you need not think I don't know the difference between a pin-prick and a bee-sting. If you touch my ankle again I'll ——" No—no you must not. I must hold the queen cage ready. What! have you seen her B.—got her?"

"Yes, grip my belt—I must have both hands."

"Good—I have you," from the drill mistress.

"There, Doris, you may carry her. Ask the workman to help you down."

Now, we must lower the basket, but first make the rope safe to the chimney. Passengers lands in Durban in the basket. Are the men in the tug boat ready? The Juniors chorus "Ready."

Eager hands are stretched to be the first to touch it.

"Gently, gently," says the politician, "A little more rope."

"That enough?"

Quite—got it—Lovely!

A SYMPOSIUM.



"You should see the new veils B has made for us."

"Made them—bought the net you mean—she can't sew."

"No—made them—not to fix round the brim of the hat but to go right over and hang smooth in front, like the new one."

"The same as hers?"

"The same shape but stronger net—ripping I tell you. Bring Helen's hat if

you are going upstairs. I am mistress, see, and have to take in the marks."

"They are nice. Let's put them on now."

"Yes, but not tied, thrown back, so."

"Where are we going? To take off sections at the cross bees?"

"Yes—tea, cake, strawberries and cream, etc."

"Elsie, you are a true bee-girl, for after all bees *are* an excuse for having a good time."

"They make one forget school, and returned lessons at any rate."

"Don't they just."

And thus it was that we went off talking merrily—a light breeze playing with the veil strings and promising to do its best to keep off the rain clouds, for at least one afternoon. From force of habit we had fallen into line. With a triumphant war-path sort of feeling and almost martial tread we went swinging down the highroad. Suddenly a tennis party appeared in sight.

"They succumbed, I suppose," said a listener to whom I afterwards recounted the day's adventure.

"Succumbed—they lowered their rackets and slunk past—totally eclipsed."

Our first halt was at the Swiss chalet, from which we had taken the bees a few days before. The lady was out but the Kafir girl grinned plentifully at our approach.

"The bees—yah—they had gone."

"When?"

"The day—the day after to-morrow."

"Plenty bees?"

"Yah *miningi*," pointing first to the tall gum tree, and then in the direction of the station.

The drill mistress had seen a swarm take possession of the station-house two day before—the day after to-morrow obviously—the roof bees might still be our bees—we had certainly worked for them. Of course that is if the Stationmaster would let us. Well he had never refused yet, and more than once had risked stings in taking off the iron.

The road forked at the stile, and it was already a deadlock because of two girls who had thrown themselves simultaneously against the arms.

"Sections or bees, which?"

"Bees."

If we go to the Station what about tea—tea and cake, strawberries, cream, etc., etc.!

There was a resigned, "it cannot be helped." "But," added Elsie, "We can go to the butcher's for tea afterwards."

Tea at the butcher's did not sound appetising, so I suggested my room on our return.

The Stationmaster gave in at sight and sent for a screw-driver. A returned empty—a nice clean butter-box was commandeered as a swarming box and continued its journey a few hours later—*after* we had hived the bees. We missed our bee-spoons, but the waiting-room tumblers did beautifully and we toasted each other in glasses brimful of bees.

The Kafir girl was right. There were plenty *miningi*—a magnificent swarm. We hived them with huge delight and adjourned to tea.

It was a lovely tea party. No one remembered the plums and cake—did not even miss them, for Doris's home people had sent some lovely section from her very own bees, and "Of all the meals to be bought for money there is none to equal bread and honey."

The discussion began with a question from a new girl.

"Do you think we could ever eliminate the sting?"

"Oh, we don't want to," was the general reply, "there would be no fun without the stings."

The bee-class as a class are fearless of stings. The excitement helps, and, like Mark Twain, they find that when there are two or three it is *not nearly so painful*.

From three bee-keepers working alone, however, accounts are not so cheering. The first says his bees are possessed—they chased an old man a mile—a whole mile without stopping. Poor old man! It was too bad—such behaviour was quite unpardonable. Little wonder their owner shakes his head dolefully, and says he must get rid of the lot. The second, "Can you come and take off sections—the bees are too vicious for me to do it alone." The third, "I don't know what you will say, I am really afraid to go near my bees," and this from one who has delighted in them exceedingly.

In this respect the Orange River bees appear to be the worst—one sting means three days in bed! One member of the bee-class has a hive which she declares are rank Pondos, while another had heard of some in the uplands of Natal, who stung the mistress of the house and she had asthma, the daughter of the house and she had asthma, and the housemaid and *she* had asthma!

Natal bees, though not so cruel as those of the Orange River, and not as a rule asthmatical, are sometimes quite formidable enough. It takes all one's courage to go near them. I have several hives which I never go near without first asking for the prayers of the congregation. My friend, who represents the congregation, smiles and gives me her moral support, while she also has a cool drink ready against my return.

Honey would be quite a fabulous price if one charged for the stings! So, while sympathising with the timid ones, I can only say, "Take your courage in both hands and be brave."

"Master myself and then I shall be able to master the bees, I suppose."

"No, don't think of yourself—think only of the bees."

"What do you mean?"

"Well, some years ago a visitor came to see my bees and stood persistently in front of the hives. I asked him to step aside. 'Oh, he replied, I don't mind stings.' 'You may not,' I ventured, 'but I mind losing my bees!' We must think of the bees for what is only a pin-prick to us is the life of the bee."

"Pin prick indeed! Poison dart, say, a red-hot sword, a flame of the desert. Why should they have stings?"

Why should some quite lovely plants have thorns? The old-fashioned botanist would explain that they are there to protect the plant from browsing animals. But the real explanation is a much deeper one. There is no doubt, of course, that the thorns do protect the plant, but to say that that is the reason of their existence is equal to saying that be-

—because we sometimes kill cockroaches with our slippers, that is the reason we wear slippers!

When a bee stings he does not do so in her own defence, but in the defence of the community. We short-sighted humans call them vicious, whilst each is a little martyr—however foolish—throwing her life away.

“But does she know that she is giving her life in the defence of the community?”

“Does she know that she will die?”

These are questions difficult to answer.

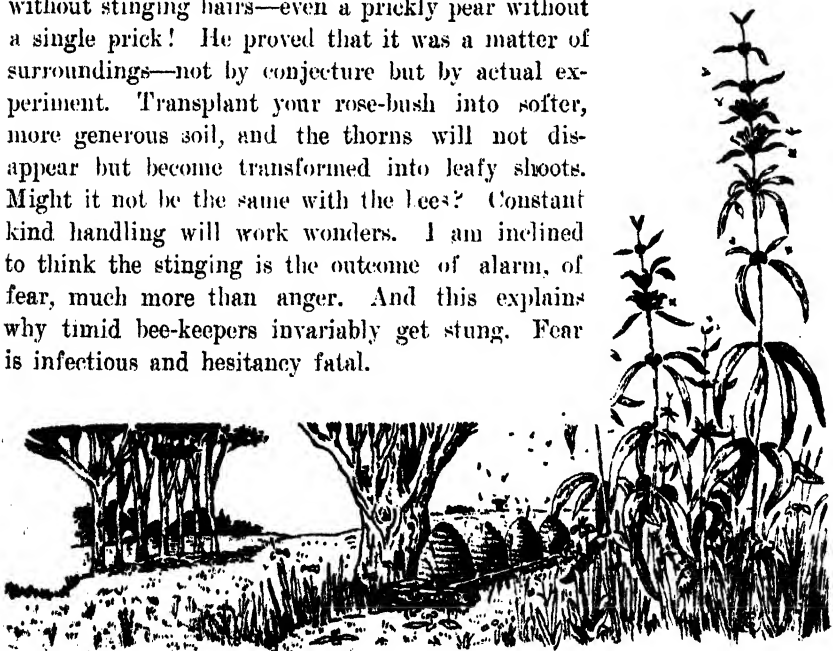
“It is a matter of instinct, bees are reflex machines.”

Well, we are reflex machines—to a certain extent. The bees dart at our eyes, and our eye-lids—luckily for us—close before we have time to think.

“Some hives never sting,” says the new girl.

“Neither do they do anything else,” murmurs Doris, with the wisdom of a post graduate. This brought us back to the first question, “Can we eliminate the sting?”

Mr. Burbank, the American florist, grew a cactus without stinging hairs—even a prickly pear without a single prick! He proved that it was a matter of surroundings—not by conjecture but by actual experiment. Transplant your rose-bush into softer, more generous soil, and the thorns will not disappear but become transformed into leafy shoots. Might it not be the same with the bees? Constant kind handling will work wonders. I am inclined to think the stinging is the outcome of alarm, of fear, much more than anger. And this explains why timid bee-keepers invariably get stung. Fear is infectious and hesitancy fatal.



Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

LAYING WORKERS.

WHAT apiarist has not at some time been worried with a laying worker?

In the *A.B.C. and X.Y.Z. of Bee Culture* Mr. Root describes the laying worker and its habits very fully, and, with the exception of the wax-moth, the laying worker probably gives more trouble than anything else to the budding apiarist in South Africa.

About two months ago I "Alexandered" a hive—i.e., took some frames containing eggs, brood, and workers from three good colonies, and so started a new one. In due course a queen made her appearance, and the little colony seemed very proud of her. They were fed regularly every night, and they had some nice stores ready for the time when "Her Majesty" should begin to lay. On examining the hive about three weeks later, however, I discovered to my consternation that there was no queen, and that the colony had set up a laying worker. Evidently the queen had been snapped up by one of the "bully birds" which have been hovering around the hives for some time past. I am sorry to see, by the way, that "bully birds" (Dronka Shrikes) are protected by Government, and it is very annoying, to say the least of it, after one has gone to all the trouble of breeding queens to have the beautiful little creatures snapped up by these wretched birds and not be able to wreak one's vengeance upon them, except under dire penalties. But this is digression.

Having made certain that the colony was queenless, first, by observing the number of eggs scattered about the cells, second, that the workers were bringing in no pollen and were appearing to feel generally disheartened, I set to work to discover the laying worker. I first of all examined each frame carefully to try and catch her in the act of laying, and after having spent some considerable time without success I tried this experiment. I first of all made the entrance so small that only one bee could get in at a time, removed all frames and bees, leaving an empty hive and replaced cover. I then shook the bees on a cloth spread in front of the hive, and watched each bee crawl back, replacing the frames as the bees were shaken from them. While watching the bees I had shaken from the fourth frame I saw some small commotion, and on examining it found to all appearances an ordinary worker bee with a retinue of some three or four others. I watched the way the retinue

paid attention to this bee for some time, and saw "the bee," who fancied herself the queen, put out her tongue, when one of the retinue rushed up and immediately fed it. "The bee" and retinue proceeded towards the hive entrance. Most of the other bees had by this time crawled into the hive. I then injured "the bee," and noticed that the others collected around her in an alarmed way. I then killed and removed her. I examined the fifth and last frame to see if, by any chance, there should be another "bee with a retinue," but found none. I then gave the colony another bar of eggs and brood, and in ten days had the satisfaction of observing that a queen was to be born very soon.

This should provide an extra means of getting rid of troublesome laying workers, should Root's methods fail.

WALTER J. FULLER.

Regarding Horses.

GOOD AND BAD STABLE MANAGEMENT.

AN Association in Philadelphia, U.S.A., devoted to the interests of work horses has issued some brief but sensible remarks on the subject of good and bad stable management, from which we take the following:—

GOOD POINTS.

- Men bring the horses in at night cool and breathing easily.
- Legs well rubbed if wet or muddy, or if the horses are tired.
- Head, ears and neck well rubbed if wet from rain or sweat.
- Horses sponged under collar and saddle.
- Horses well brushed if dry.
- Feet washed and examined for nails.
- Eyes, nose and dock sponged in summer.
- In very hot weather, horses wiped all over with a wet sponge on coming in.
- Horses given a little water, but not much, on coming in warm.
- No grain fed for at least an hour.
- Horses watered when cool, then hayed, watered again, and grained.
- In any case watered twice after coming in at night.
- Plenty of bedding and horses bedded down all day Sunday.
- Hay and grain of best quality.
- A bran mash Saturday night; cool in summer, hot in winter.
- Hayloft kept clean; cobwebs swept down.
- Harness, especially collars, kept clean.
- Wide stalls.

Horses tied long, so that they can lie with heads on the floor.
Plenty of fresh air but no draughts.
No fumes from manure pit.
Stalls not boarded up, but grating in the upper part.
Stable quiet at night and on Sunday.
Slatted outside doors for hot weather.
Stable foreman good tempered, and not a drinking man.
Most important of all—horses handled gently, neither struck, nor yelled at, nor sworn at.
Owner drops in often.

Heavy, strong horses given but a two-thirds ration and exercise if possible, in cold weather, when compelled to be idle for more than one day at a time, as a precaution against paralysis or azoturia.

Competent veterinary attention promptly given to all sick or injured horses.

BAD POINTS.

Horses brought in hot and breathing hard.
Horses stripped off roughly and horses rushed into stalls without rubbing, cleaning or sponging.
Horses allowed to drink their fill, no matter how hot; or not watered at all.
Grain fed before the horses are rested.
Feet not washed or examined until the horse goes lame.
Horses receive no water after eating their hay, until next morning.
Scanty bedding.
Hay and grain of poor quality.
Bran mash not given—too much trouble.
Hayloft dusty and dirty.
Stable full of cobwebs.
Harness unclean; sweat allowed to accumulate on inside of collars.
Narrow stalls.
Horses tied short for fear of being cast, as is likely when they are put up dirty.
Stable close—no ventilating shaft.
Windows dirty.
Manure pit ventilates into stable.
Stalls boarded up high, where the horses' heads are.
Men loafing in the stable in the evening and on Sunday.
No slatted outside doors for hot nights.
Stable foreman addicted to drink.
Worst of all—horses handled roughly, knocked about; general atmosphere of noise and profanity.
Owner never sees the horses taken out or put up.

Ostrich Farming.

AN INSTRUCTIVE LECTURE.

At the last Annual Conference of the Orange Free State Agricultural Judges' Association, Mr. Oscar Evans read an instructive paper on ostrich farming. As the information which he gave will be of interest to many of our readers, we reproduce from the *Bloemfontein Post* the following account of the lecture:—

Mr. Evans stated he would speak about practical ostrich farming from a practical point of view, as he was not an expert in the business—but confined himself to the practical part of the industry. He advised them first of all to procure the very best blood in the country even if they had to pay a long price for it: it would very soon repay them. He deprecated the inferior stock which was being introduced into the Province. He had seen some feathers which were not quite up to the standard produced in the Free State and which would not be produced in the Cape Colony. He strongly advised them to go in for lucerne farming. An inferior ostrich would produce better on lucerne than it would on ordinary veld. If good ostriches and lucerne were combined, they would produce the best in the Province.

WILD OSTRICHES.

In regard to wild ostriches, he advised them not to buy the chicks of wild birds as it would pay them best to pay good prices for good stock. There was no comparison between the introduction of the two classes of birds, and he cautioned them against buying the chicks of wild birds. As regards the feathers from wild birds, these were of a very inferior standard.

FENCING.

If the industry was to thrive there should first be good fences. The fences should not be made of stone posts or inferior wooden posts. The first thing they must do was to confine their birds in good enclosures. For this purpose he advocated stinkwood posts with six strands of No. six wire fencing. The posts should be ten yards apart and about five feet or five feet six inches high with four double straps between every two poles.

DISEASES.

In regard to diseases of ostriches, there were not very many. The first to be considered was "wire worm," which was often caused by the

birds being "run down." In the chicks there was the disease of "yellow liver," generally caused at the age of fourteen days. This was a very serious illness, but it could be combated by removing the diseased birds on to clean ground and by adopting effective preventive measures. The animals generally caught the disease when quite young and suffered from it until the age of two months if neglected.

TAPE WORM.

This was also a troublesome disease with chicks from one month up to eight or nine months old. Ostriches were not particularly delicate animals. For this disease they should be dosed with turpentine once in every fourteen days as long as they were suspected of having this parasite.

WIRE WORMS.

This was also a very troublesome disease at times from the age of two and a half months until 18 months. To prevent this they should be fed well, and be kept in good condition. Carbolic lime and sal ammoniac, etc., were good preventatives. This disease should be taken in hand at once, otherwise a heavy loss might be incurred.

WATER FOR OSTRICHES.

In regard to water for birds, he stated that they required very little of that. He never gave his ostriches much water, as they did not require it. Ostriches were very much like springboks in that respect. In really dry seasons he fed his ostriches on prickly pears and a certain amount of grain at the same time. If a drought did occur, the young ones needed special looking after. Speaking about the rainfall, he stated that on his farm it was about 12 or 15 inches in the year and the altitude about 2,000 feet. At Potchefstroom the rainfall was about 25 inches; the least that he had heard of was about 9 inches. Ostrich feathers had been grown in Cape Colony on farms that had a rainfall of about 26-25 inches.

INDUSTRIAL DEVELOPMENTS.

In the Cape Colony it has been said that the ostrich farmer was a lazy man; that was not the case. The industry had been responsible for the principal developments in Cape Colony. It had been responsible for the introduction of wire fencing. Irrigation had been dormant for years and to-day they found that farmers had gone in for the production of lucerne, and now enough ground could not be utilised for their requirements. He pointed out the large installation of pumping plants which had been resorted to. On the Fish River, in the Cape, pumps were now being put up at a terrific rate, and he pointed out at some length his

methods of producing charcoal by means of which he was able to produce a million gallons of water at a cost of four shillings. If it had not been for the ostrich farming, the farmers would never have gone in for irrigation. He stated that ostrich farming was a very lucrative industry, but by no means a lazy industry. If ostriches were to be imported into the Free State the difference would soon be seen, and there was no doubt that in time this was coming about.

OVER-ESTIMATION.

He deprecated what sometimes appeared in the newspapers in regard to the over-estimation of the industry. He had once seen that the feathers of one bird had been disposed of for £150. That might have been the case, but, generally speaking, it was most unlikely. The feathers from a couple of average birds would be valued at £7 10s. to £15 a year. £25 had been returned, and there were instances where even larger sums had been forthcoming, but it was wrong to exaggerate the industry.

REMOVAL OF FEATHERS.

In plucking, the usual method when grazing on lucerne was to cut the feathers at six months' growth and leave the quills in for two months and then draw them when they would be quite "ripe," and then cut them again six months after. Three clippings a year would thus be obtained. The removal of the feathers was a relief to the bird. On the high veld many farmers only took one pluck a year. He never drew the quills in June or August.

BARBS IN FEATHERS.

"Bars" in feathers should be avoided as much as possible in the selection of breeders as some breeds of ostriches were more prone to them than others. The bar was generally caused by a night growth. He hoped that the researches which of late had been made in regard to the ostrich industry would be continued and expended, and that the Union Government would cause to be instituted a scientific research for the better production of feathers and the elimination of the "bar." Mr. Evans then handed round several excellent specimens of ostrich feathers, amongst which were some "Barbary" feathers grown on wild birds in Egypt.

THE FUTURE OF THE INDUSTRY.

Mr. Evans stated that at present the prices for ostrich feathers were prohibitive. There were still many requirements which ostrich feathers could be put to which now were out of the question owing to an insufficient production. Over production was therefore advocated. The chairman then threw the meeting open for questions to be put to the lecturer.

QUESTION TIME.

Being asked the difference between two specimens of feathers, he stated that this was attributable to bad birds, bad stock and breeding from inferior stock. Even if better feeding was resorted to, the specimens referred to would only improve by about ten per cent.

Asked which was the most desirable to commerce, the industry with breeding birds or feather birds, the lecturer stated that if lucerne was grown it was better to get breeding birds and raise a good stock. It was, however, a question which remained entirely with the farmer.

In regard to the O.F.S., did he think birds would thrive here?

The climate was quite good, but better fences and more lucerne was required.

In regard to the production of feathers the lecturer stated that the ostrich in its seventh or eighth year went off in regard to feather production. Its prime was its third or fourth year.

How many eggs did a bird lay in a season?

If incubation was resorted to, about 25. He did not believe in incubation, but preferred the natural hatching. If valuable birds had to be kept for breeding purposes, others should be left to do the hatching. An ostrich laid an egg every other day.

Being asked as to the price of a couple of birds, he stated that prices varied. An average pair could be obtained from £100 to £150 the pair. The breeding age was when about three years old. He had known a case where a cock starting breeding at the age of ten months.

How often was lucerne watered during the winter?

Mr. Evans stated it should be left dormant and watered in the spring. In the Cape they had been compelled to water it during the winter. He had watered it twice if a dry summer was expected. If they were compelled to they could water it twice but not more.

TRANSVAAL OSTRICH FARMING.

At the request of Mr. Palmer, the Transvaal Ostrich Farming Expert, Mr. Thornton, gave those present a few particulars regarding that industry in the Transvaal. He stated that at Potchefstroom and other places the industry was progressing very favourably and a good quality of feathers was produced. If the industry answered well there, it should prove equally productive in the Free State. It was, of course, known that South Africa stood at the head of the world's ostrich feather industry, and it was their duty to keep that position. It was an obligation on the part of the Government to foster and protect this industry as far as lay in their power. This could be done by production and advancement in

breeding. They had total prohibition in regard to eggs and birds. He strongly recommended that the transport of birds by sea from one part of South Africa to another should at once be put a stop to. The time had also come when some of the best birds should be bred only for stud purposes. A couple of the best strains had been kept fairly pure by private enterprise. This should now be extended, and therefore the State should acquire some of the best birds and commence experiments. At a recent ostrich farmers congress it had been suggested that it was desirable to have all the young birds of inferior quality killed. In his opinion it was one of the maddest things he had ever heard of. It was necessary for everyone in the industry always to endeavour to breed the best. He thought that wild birds should be caught and put on experimental farms for the purpose of ascertaining whether something good could not be produced. In regard to fencing, he could only say that if ostrich farming was carried on in the Transvaal and the O.F.S. to the same extent as it was in the Cape, tick fever would not be able to spread.

Mr. Palmer then moved a hearty vote of thanks to Mr. Evans for the address given and the kind manner in which he had answered the many questions put to him. He also proposed a hearty vote of thanks to Mr. Thornton, and these were heartily accorded.

A horse confined in a dark stall, and then taken out suddenly into the bright sunlight, will in time suffer from bad eyes.

The natural place for a horse is in the open air, and if he is confined in a stable it should be well ventilated and have plenty of light.

Fed in large quantities, salt is poisonous to fowls, but when fed in a moderate quantity, at the rate of 1 oz. to every 100 fowls, is beneficial.

There is such a thing as getting the hens too fleshy. They are apt to become lazy and sit down all the time. Stop feeding such heavy food.

The food for small ducks should always be of a soft nature. They will not thrive well if fed a large part on whole grain, and this often causes many deaths.

Prolonged exposure to a temperature below 30 degrees or above 80 degrees will so injure its germ that it will soon render the egg unfit for hatching purposes.

Tree Growing in the Zwaartkop Native Location.

By C. S. HAYTER,
Supervisor, Natal Native Trust.

INTRODUCTORY.

AT the present time considerable interest is being taken in afforestation and tree planting. Good prices have been realised during the past year by those who have been lucky enough to have mature plantations for disposal. An incentive has also been given to prospective planters by the prizes offered by the Agricultural Union.

Most of the wood which is being cut is sent to the Rand as mine-timber. In many cases trees of valuable kinds are used, which should realise better prices were they sawn up for various industrial purposes. No doubt as planting is more largely carried on, so that a regular supply can be depended upon, the supply will tend to create a greater demand. Industries utilising timber will spring up in our midst and countless articles be manufactured locally which are now imported. The mine-timber-trade will always be a profitable means of disposal for the less valuable kinds, and, as years go on, the extension of the mining industry will tend to cause a still greater demand, while the growing scarcity of timber throughout the world will cause imported timber to become more expensive, so that a considerable increase in prices may be expected.

THE N.N.T. PLANTATIONS.

In the present article I propose to give some account of what is being done by the Natal Native Trust in the direction of afforestation in their plantations in the Zwaartkop Native Location, together with some notes upon the progress made by the various species of tree which have been tried.

These plantations were begun in 1903. In January of that year the late Inspector Thomas Fayle planted the first trees in some land attached to the disused Native industrial schools on the southern slope of the Zwaartkop, not far from Henley Station. There were raised from seed which the then Minister for Native Affairs, Mr. F. R. Moor, had brought back with him from Australia.

In 1905, during Col. Leuchar's term of office, the larger plantation here near Taylor's Station, called the "Inadi," was started. Since that time the area under afforestation has been steadily increased year by year until now the total area under timber amounts to 478 acres. Of this, by

far the greater part is planted with Eucalypts of various kinds, but considerable areas of Pines and Cypress have also been grown.

The Zwaartkop plantation is about 3,000 feet above sea level and the Inadi 3,700 feet and upwards, both having a south-easterly aspect. They are both sheltered from the north winds by the bush-clad slopes of the Zwaartkop range.

The soil varies from dark brown to red loam with a red subsoil and is on the whole of considerable depth, although in some places the soft, white shale is near the surface. There are also frequent outcrops of whinstone.

The district is subject to very heavy drizzling mists, which sometimes prevail during the summer for as much as a week on end.

THE RAISING OF SEEDLINGS.

The raising of seedlings and after care of plantations is carried out here very much on the lines described by Mr. T. R. Sim in his book "Tree Planting in Natal," and for general information on these subjects the intending planter cannot do better than refer to its pages.* Nevertheless, a few remarks dealing with matters noted from personal experience will perhaps not be found out of place, and it is to be hoped will prove of interest to some.

In every case I wish it to be clearly understood that I am merely writing a record of the practice followed, and the results obtained in this district. In other localities different methods and different species of trees may be more successful.

The most suitable time in this district for the sowing of most tree seeds has been found to be the month of March. With very quick-growing kinds an early spring sowing may be made, as soon as the severe frosts are over, usually about the middle of August.

March sown seedlings remain sufficiently small to be left in the seed tins through the winter months and stand the cold well, if sheltered during the winter nights with Hessian screens.

Later sowings require much more protection, as the seedlings are so small that the action of the frost pulverising the damp soil in the tins causes them to lose root hold. Earlier sowings are not to be recommended, as the seedlings grow so much that they have to be pricked out before winter. This entails a great increase of labour in watering and shading from frost. Moreover, as suitable weather for planting out seldom occurs much before December, they are apt to grow too big and lanky in the tins. The March-sown seedlings are ready to be pricked out as soon as frosts are over, thus gaining about six weeks' start of spring-sown

* Copies of this work are obtainable from the Superintendent of Government Printing and Stationery, Maritzburg; price 2/6.—Ed.

plants. The seedlings are pricked out to 30 in a tin, as is the customary practice.

Before seedlings are planted out, the tins should all be carefully gone over and weak, crooked, or discoloured seedlings and those of different species removed. These will never produce good trees. Natives, if left to themselves, will frequently plant out even dead plants, and if there is a large gang at work it is not easy to see that they do not set out worthless specimens while the planting is going forward.

PLANTING OUT.

When possible, fresh virgin veld should be chosen for planting. Trees will grow well enough on old cultivated lands, but the work of keeping the weeds down adds greatly to the expense. Care should be taken only to plant quick-growing, heavy-foliaged kinds in such positions.

December, when the weather is suitable, is the best month for planting out. Trees planted then get thoroughly well established, and make considerable growth before the winter comes on. January-planted trees do well, and those planted in February fairly well. March plantings get a poor start, and the difference in their growth is apparent for several years afterwards. Especially is this noticeable with the slower-growing kinds.

In these plantations, during the first years, all the trees were planted at 10 feet apart. This was partly because it was thought to be a suitable distance and because the trees were then being purchased from the Government Nursery at Cedara and elsewhere. To have planted them closer would have entailed too great an expenditure.

Since 1906, every tree planted has been raised in our own nursery, and close planting has gradually been adopted. Except in exceptional circumstances, all planting is now done at 5 feet apart. This costs more, as many more seedlings have to be raised and planted out, but the extra trouble and expense is amply repaid. Trees so planted grow taller and straighter and are not so liable to make forked stems or to twist. They shield one another from the wind, and, which is a greater consideration, kill the grass out sooner. This lessens the danger from fire very considerably, although, as was seen by the disaster at Cedara last year, a fire, borne by a strong wind, may sometimes run through along the dry twigs, which abound on young, thickly-grown saplings.

Some kinds of Eucalypts are so quick and straight in growth and naturally produce so few branches, that they grow into very fine trees at wider distances, and at the same time make a heavy stem earlier than when close planted. This early girth increment is put on at the expense of height in most cases. When planted as far apart as 10 feet some will form canopy in four years and kill out the grass, while others, and many

of the most valuable timber-producers among them take many years to do so, and, as it is too expensive to keep them weeded for so long a time, the danger of fire continues to recur ever winter. When they are planted at 5 feet apart the quicker-growing kinds destroy all undergrowth in two years; the slower ones in about the fourth year.

When it is not possible to plant at 5 feet, and it is desired to plant somewhat slow-growing species, a good intermediate distance is 7 feet apart. The diagonal of a square whose side is seven is almost ten, so that if later the alternative trees in each row are removed in thinning, the remaining trees will stand nearly 10 feet apart.

These last remarks refer more especially to Eucalypts. To plant heavy-branched trees such, as Cypress or Pines, at a greater distance than 5 feet apart, would be next to useless, where they are grown for the production of timber. The branches would persist for many years and grow to such a size, before the trees formed canopy, causing them to die off, that the wood would eventually be full of large knots.

THINNING.

Where the trees have been planted at 5 feet apart, they will have to be thinned out in from 5 to 8 years, according to their rate of growth. This thinning is best accomplished by going over them twice. The first time every other row may be removed, and after two or three years the alternate trees be cut out in the remaining rows. If it is preferred, the alternate trees in each row may be removed at the first thinning and at the second the alternate rows be removed entirely. The latter method is perhaps preferable for slow-growing kinds, as it preserves the canopy better. In either case, when these thinning have been carried out the remaining trees will stand at 10 feet apart. Unless the plantations are very regular in growth, these operations should not be performed by rule of thumb, but the poor and undersized trees ought, when possible, to be weeded out and the best specimens left standing, even though this cause some irregularity in their arrangement.

Later on they must be thinned again, but they will then have arrived at such a size that the thinnings may be profitably disposed of as mine props, etc.

NOTES ON THE SPECIES GROWN.

The following notes give some account of the progress made by various species which have been planted here, and which have already made four seasons' growth and upwards. Several other kinds of Eucalyptus, also Silver Oak, Black-wood, *Cryptomeria Japonica*, and *Casuarina leptoclada*, are being grown, but are as yet not sufficiently advanced for an opinion to be formed on them.

As regards the reputed qualities of the various woods, and the uses to which they may be put, no personal experience is claimed of them, but such evidence of their value as has been gained in other countries is quoted.

In all cases where measurements are given, care has been taken to put them rather below the mark than otherwise. The diameters are quoted at breast high.

Eucalyptus amygdalina (*Giant Gum*).—A valuable timber, but not lasting underground. This has so far proved the quickest growing of any. It is a very handsome, straight-growing tree, with long, narrow leaves and weeping branches. It is also very hardy. The variety *reginae* is as quick growing as the other. It has wider leaves of a lighter green colour, when young. The narrowest leaved variety, *angustifolia*, has not done so well as the others. It grows slower and less straight, and is apt to break out into a lot of coppice shoots. As an ornamental tree it is very distinct.

In a block in its fifth year the largest trees exceed 50 feet in height and 7 inches diameter; the average diameter is 4.52 inches, and 52 per cent. exceed 5 inches diameter. Some younger plantations planted at 5 feet apart give promise of even better results.

Eucalyptus botryoides.—Produces a good timber. Has proved most successful. A block of 2,000 trees of this species is one of the most even in the plantation. It makes a beautifully straight stem and carries such heavy foliage that it has killed out all the grass in four years.

Although planted at 10 feet apart, the best trees are 45 feet high and exceed 7 inches diameter. The average diameter is 4.35 inches, and 53 per per cent. are over 5 inches diameter.

Eucalyptus bicolor.—A disappointing grower. When first planted it soon makes a show. It afterwards sends out a great many shoots and branches. So far it has shown no sign of developing into more than a large shrub.

E. corynocalyx (*The Sugar Gum*).—A very durable timber. It has a nice straight habit, but is apt to branch heavily if not planted close. As it is more difficult to transplant than most kinds, it should only be planted out during a spell of wet, dull weather. Otherwise its leaves become scorched and it receives a considerable check; in fact, the weaker plants get scorched up altogether. It must only be tried on warm and clean sites, as it is most liable to be frosted off during the first years of its growth. It goes ahead very quickly while young, but is said to be slow-growing as it gets older.

The following measurements are taken from trees planted on shallow land overlying white shale. Probably better results would have been attained in a more favourable position. Trees in their fifth year show

58 per cent. over 3 inches diameter and about 35 feet high. The average diameter is 2.46 inches.

E. hemiphloia (Grey box).—Timber very highly spoken of. Although this species is said to do well in some parts of the Colony, it has been very disappointing here. Its culture has been given up altogether for the last three years. Four blocks have been planted in different soils and situations, but none of them show other than poor results when planted at either 5 or 10 feet.

In a plantation at 10 feet, in its seventh year the largest tree shows a diameter of 33 feet. Fifty-seven per cent. were over 3 inches diameter, and the average diameter was 2.5 inches. Thirty-nine per cent. of the trees were hopelessly crooked.

E. microcorys (Tallow wood).—Highly valued in Australia as a timber tree. Only one block of this has been tried, and in a rather cold position. Nearly all the trees succumbed to the severe winter of 1907. A few in a warm corner escaped the frost and have since done well. It makes a good straight stem and is a moderate grower.

E. obliqua (Stringybark).—Valuable timber, but not durable underground. The chopped bark is suitable for using as a packing material. Grows straight and quickly. The seedlings are somewhat tender, but it is hardy when it has completed a year's growth. It is a bad tree to plant outside of a plantation, as its bark is very inflammable. Trees here which have completed seven years' growth are self-sowing themselves freely.

In a block in its seventh year, planted at 10 feet, the largest trees have a diameter of 11 inches, and are about 55 feet high. Forty-eight per cent. exceed 7 inches diameter; the average diameter is 6.8 inches and height 37 feet. The bark is very thick, so that the diameters are somewhat deceptive.

E. paniculata (Torrrale gum).—A very durable and excellent timber, good underground. Grows straight but rather slowly. Should be planted close, as it is apt to make heavy branches and to fork. Its top is also very liable to be broken by the wind. It is tender in this district, and is only successful in warm positions.

In a block in its fifth year the largest trees have a diameter exceeding 4 inches, and are above 30 feet in height. Sixty-two per cent. exceed 3 inches diameter, and the average diameter is 2.66 inches.

E. pilaris (Black Butt).—Very highly spoken of as a timber producer. A quick-growing, heavy-foliaged tree, that soon kills out the grass. It seems to be less root-firm than most species of Eucalyptus. There have been more wind falls in a block of this kind planted at 10 feet than in the rest of the plantations put together. Among some planted at 5 feet this tendency has not been so noticeable. It only stands the frost here in

warm situations. Even then the young trees get scorched, but they quickly recover.

In a block in its fifth year, the diameter of the largest trees exceeds 6 inches, and they are from 40 to 45 feet high. Sixty-seven per cent. have a diameter exceeding 4 inches. The average diameter is 3.92 inches.

E. punctata (*Leather jacket*).—The timber is said to be very durable. Grows fairly straight and has a healthy appearance, but is slower than any species that has been planted here, with the exception of *hemiphloia*. As so many kinds of equal or more value do so well, it is not to be recommended for localities similar to this.

In a block in its fifth year the largest trees have diameter exceeding 4 inches, and are about 30 feet in height. Thirty per cent. exceed 3 inches diameter, and the average diameter is 2.14 inches.

E. rostrata (*The red gum*).—One of the best of Eucalypt timbers. Has been planted very largely. There are two varieties, the one having broad leaves and the other narrow. The broad-leaved one appears to be the better grower of the two. As it is apt to grow crooked and forked, *E. rostrata* should be planted closely. Moreover, as its foliage is sparse, widely-planted trees allow the grass to grow beneath them for many years. Early planted trees make very much better progress than those set out late in the season. The seed is very small, as many as 100,000 seedlings having been pricked out from a sowing of 1 lb. of unsifted seed. It is always apt to produce a large percentage of crooked and worthless trees, but the number of these can be greatly lessened if care be taken only to plant out healthy, well-grown seedlings.

It is very hardy, but on a cold flat here some few trees have been frosted during hard winters.

In a plantation in its seventh year on good soil, the largest trees have attained a diameter of over 7 inches and a height of 50 feet. Fifty-six per cent. exceed 5 inches diameter, and the average diameter and height are 4.9 inches and 35 feet respectively.

E. Saligna (*The Sydney blue gum*).—The timber is highly recommended. One of the most successful trees which have been tried here. Very quick growing, straight, and luxuriant. It is rather tender, but trees which were cut back by frost in 1907 quickly recovered themselves in the following summer. It is an excellent tree to grow where wide planting is adopted, as its ample foliage keeps down the grass, etc. When planted closely it shoots up at a remarkable rate.

In a block in its fifth year the diameter of the largest trees exceeds 6 inches and their height is about 45 feet. Forty-eight per cent. exceed 4 inches in diameter, and the average diameter is 3.4 inches. These are planted at 5 feet in rows 10 feet apart.

E. sideroxylon (*Red iron bark*).—An excellent timber, suitable for

sleepers, etc. Does well here and is very hardy. For the first three years it grows slowly and is apt to branch. After that it goes ahead and produces a good straight stem. The foliage is very narrow, and, as with other moderate growers, it should be planted closely to obtain the best results.

In a block in its fifth year the largest trees exceed 5 inches diameter and 35 feet height. Fifty-two per cent. exceed 3 inches diameter, and the average diameter is 2.47 inches.

E. Stuartiana (*The apple scented gum*).—Only a second-rate timber. Has grown very straight and fairly quickly so far, but the oldest trees are only in their fourth year.

E. tereticornis (*Forest red gum*).—Timber of similar quality to that of *rostrata*. Has proved a somewhat irregular grower, many trees remaining dwarfed while others have gone ahead very quickly. By careful weeding out of the seedlings this tendency can be to a great extent avoided. Most of the remarks which have been made upon *rostrata* apply equally to *tereticornis*. It grows straighter than the former, but has not proved quite as hardy. It has been planted here very largely, and, despite the irregularity above mentioned, it has made a somewhat better average growth than *rostrata*. In a block in its fifth year the diameter of the largest trees exceeds 6 inches and the height is about 45 feet. Forty-two per cent. exceed 4 inches diameter, and the average diameter is 3.25 inches.

E. riminalis (*Manna gum*).—Only second-rate timber. One of the quickest, straightest, and hardiest. The following measurements are from trees grown on a dry, poor hillside, where, in many places, there was only just enough soil overlying the white shale to allow of a trowel hole being made to plant the tree in.

In a block in their fifth year the largest exceeds 7 inches diameter and 50 feet height. Seventy-eight per cent. exceed 4 inches diameter, and the average diameter is 4.14 inches.

Pinus pinaster (*Cluster pine*).—A soft timber, suitable for the same purposes as deal. May be either raised in tins and planted out in the same manner as Eucalypts or sown in sites. Trees which were planted out from tins and are now in their fifth year are from 6 to 10 feet high.

The seed may be either sown broadcast, about 20 lbs. to the acre, or, if preferred, may be planted at intervals with a Kafir hoe, as is done with wattle seed, but in closer lines. In either case the young trees should stand 5 feet apart, or, if anything, less. Sowing in drills is unsatisfactory, as the seed is very much liked by rats and mice, which will run along the rows digging it out. They also eat the young plants.

The greatest drawback to the planting of pines is their great inflammability. Owing to their slow growth while young, it is years before they kill out the grass. To keep them weeded entails too much expense, except in the case of small patches. Their planting should only be under-

taken in clean land, as far as possible from old gardens, etc., which may disseminate weed seeds.

Where planting of pines on a considerable scale is intended, plantations should be split up into blocks not exceeding 100 acres in extent. Around the edge of each block a belt of quick-growing, grass-destroying trees should be planted. A strip of grass land 100 feet wide should be allowed to remain between the different block. The belts of non-inflammable trees must be kept clean, and the grass strips be burnt off each winter in still weather. By this means the danger from fire is reduced to a minimum.

Pinus halepensis (Aleppo pine).—Has also been tried, but has so far not given nearly such good results as pinaster.

Cupressus lusitanica (Cedar of Goa).—Produces a sweet scented wood of light reddish-brown colour, which should prove very useful for joinery and indoor work. Its timber is highly prized in the East. Has been largely planted. Trees in their fifth year are in many cases 20 feet high and over 3 inches in diameter. Close planting is necessary, owing to its branching habit, but it makes a beautifully straight stem. These trees, like pines, are highly inflammable and while in the thickest stage they would make a terrible blaze, should a fire get among them. It should only be planted within belts of other less inflammable trees, and well away from roads, etc. Up to their third year they are very liable to be barked by rats during the winter. If they are planted in clean land much trouble is not caused by these pests, but in moist valleys where there is a thick growth of weeds they do a considerable amount of damage.

Populus alba (White poplar).—Timber in great demand for match sticks, etc. A very good tree to plant in damp, cold, spots where other kinds will not thrive, and which usually grow a rank crop of weeds and grass. It grows very quickly, suckers which were planted two years ago having attained a height of 15 feet and over. It seems hardly to suffer at all when grass fires pass by it, which is certainly a most admirable characteristic.

The tool shed, if properly used, is often the most profitable equipment on the farm. Expensive farm machinery, when left in the sun and rain, greatly deteriorates.

Don't use a vicious dog for driving the milk cows. There is nothing that will decrease the milk flow like fear.

Sugar-Cane Culture.

SOIL WASTES IN CANE FIELD.

IN an address given some years ago at the annual meeting of the Pioneer River Farmers' Association, Mackay, Australia, Professor Shelton gave a good deal of advice to cane farmers, much of which, as contained in the following extracts from his address, applies equally well to-day to the industry as it did in 1896. We are enabled by the *Queensland Agricultural Journal* to publish these extracts here.

IMPROVEMENT CHIEFLY THROUGH THE SOIL.

After a careful survey of what may be called the possibilities of the cane-grower, it is impossible to resist the conclusion that to the soil chiefly he may hopefully turn in his efforts at improvement. That peculiar combination of elements and seasons which we call climate affects the growth of crops, perhaps, to an even greater degree than soils; but to-day, as much as in the past, the seasons come and go uninfluenced by man, except indirectly through the practices of irrigation and drainage.

It is not necessary here to point out in detail the steps necessary to be taken in order to bring the cane crop to better and more profitable condition. The work that has been so successfully done in Germany with the sugar-beet and in America with sorghum indicates the course that may be hopefully undertaken with the sugar-cane. We have only to place the canes experimented with under such cultural conditions that there shall be the largest development of sugar in them consistent with healthy growth, meanwhile carefully selecting for seed those plants which show the widest variation in the direction of the improvement sought.

It is a singular fact that the sugar, which is the object of all the labours of the cane-grower, seems to have little, if any, direct connection with either the nutritive or reproductive functions of the plant. Not unlikely sugar originally appeared in the cane plant as an accident or sport. Certain it is that a large sugar content of the plant is not accompanied by a corresponding tendency to "arrow" or produce seed, but rather the reverse, while the largest and most robust canes are, as a rule, the least productive of sugar. In a sense the cane-grower labours under very considerable disadvantages as compared with cultivators of other crops. The object of the cane-grower's labours is the production of the single element—sugar: all other parts of the plant are offal to him: and the very means employed to invigorate and stimulate the growth of the cane plant tend to diminish the proportion of sugar, or to so involve it with other constituents that the difficulties experienced in separating them (milling) are greatly increased. These facts serve to show some of the difficulties of the cane-

grower. All branches of agriculture have their peculiar problems; but I am certain that the task set before the grower of hay, potatoes, or grain is a simple one as compared with that of the sugar-grower. Without attempting in the least to discredit the good work that has been done and attempted for the improvement of the stock of canes, I yet maintain that the labours of the cane-planter are chiefly concerned with the soil; and that, if the character of the canefield is maintained, he may with ordinary care in the selection of his seed, dismiss as idle all fears of cane deterioration, and to a considerable extent cane disease itself.

INDIVIDUALITY OF SOILS.

Soils in their natural condition vary in all degrees between the very good and very bad, and these distinctions are maintained, I may say, even after they have been artificially improved. A "good soil" is a good soil always, after it has been depleted by bad treatment or even "exhausted." Such soils rally quickly, responding liberally to renovating treatment in increased cropping power. Again, "poor soils" are always poor, even when rich from artificial manuring, if the seeming paradox may be excusable. These poor lands are often spoken of by farmers as "hungry" soils, and it would be difficult to more fittingly express their condition. Hungry soils, again, like the good, are found with sand, clay, or gravel predominating; even loams and soils of alluvial origin vary greatly in this natural fertility. But, whatever their character in other respects, they agree in giving the lowest returns for manures applied, in parting quickly with artificial fertility, and in possessing low cropping power. Dr. Stubbs, in a bulletin of the Louisiana Experiment Stations, on "Domestic and Commercial Fertilisers," thus refers to the varying effects of fertilisers upon soils of different constitutions, as shown by his own experiments with manures applied to sugar-cane—

"Strong soils are frequently without immediate results from the application of manures, due partly to the fact that in their defective physical condition they liberate annually as much plant-food as the plant can assimilate under the prevailing conditions of drainage and rainfall. In our sugar belt commercial fertilisers are frequently without immediate results, due to defective drainage and to the further fact that these soils, well tilled, will produce the largest crops which the rainfall will permit. Hence drainage and irrigation are both needed for maximum results with the use of fertilisers in these soils. If the soils be light, manures will nearly always produce their full effect, provided the quantity used be not excessive."

Practical farmers have already learned that often widely different results are obtained from the use of the same fertiliser; these same fertilisers often giving "no immediate results." In short, successful results with fertilisers can only be expected when applied according to the needs and

capacities of soils, and where manuring is a part of a system which embraces thorough cultivation, drainage, and even irrigation. The poverty of poor soils in Queensland, as elsewhere, is due to their failure in one or all of the following particulars:—

1. Texture.
2. Chemical composition.
3. Drainage.

With the cane-growers, but perhaps no more than with the cultivator of other farms crops, the first and most elementary consideration is good soil. The richest soil may not always be available to the selector of small means; but nothing less than kindly soil—soil that is capable of fertility and that responds readily to good treatment—ought to be accepted by him. With good soil the cultivator has everything in its power, while bad land is a burden that often outweighs even science allied to energy and capital. Fortunately, a knowledge of chemistry is not required ordinarily to detect the good from the bad in soils. The practical man sees at a glance the full significance of those signs in soils which give the clue to their nature and capacity.

CANE-FARMING AS A PERMANENT INTEREST.

The value of lands depends not altogether upon the uses to which they are capable of being put. Very often the most fertile soils have little value, while comparatively poor lands, under other circumstances, command high prices. Among the influences tending to give added value to farm lands are dense settlement, cropping capacity, and the nature of the improvements put upon lands. It is well, also, to bear in mind that the gulf which separates productive cane lands worth £10 to £30 per acre from grazing lands worth no more than 10s. per acre is neither deep nor impassable. Bad farming, unfavourable seasons, insect depredations, labour difficulties, or the loss of milling facilities are each and all sufficient to bring the best of cane soils to the condition and value of grazing lands in an incredibly short space of time. In a degree this is true of all branches of farming, but especially it applies to land given over to the growth of the single crop—cane. In every cane-growing district in North Queensland, numbers of these reverted cane farms (now grazing areas) may be seen. The way to increase the general estimate of cane lands is for cane-farmers to show *practically* their own appreciation of them. This is done, in the first place, by conserving or increasing the fertility natural to their lands, and putting permanent improvements upon them. Give to these same soils thorough tillage and added fertility within the limits of profit; under-drain them and put those improvements about the plantation homestead which the world over distinguish the farm home from a stock shed; and we shall have taken the first steps in the direction of giving to cane-farmers a hold upon the community that cannot be shaken.

ONE-CROP CULTIVATION.

The cane-grower, with rare exceptions, grows cane alone. We all know the dangers that attend single-crop cultivation; it is the old case of putting all the eggs in one basket. If the season is unfavourable to the one crop, all is lost; whereas, with a variety of crops, one or more are reasonably certain to give profitable returns, even during the worst of seasons. By varied cropping the labours of the plantation are more equally distributed throughout the year, and with several crops or products on hand something will be in demand, even when markets are at the worst. But the single crop is especially a robber of the soil. It constantly takes from the soil one set of elements, and, in the case of crops like cane, not fed to home stock but sold wholly from the farm, gives small opportunity to replace them. If cane grown in alternation with maize, say—not a scientific arrangement certainly—the corn crop would tend to restore the equilibrium of the soil by taking from it elements not demanded by the cane crop; while each crop permits the accumulation in the soil, during the period of its growth, of those elements particularly needed by the other. This gives in a nutshell the underlying philosophy of that practice in farming known commonly as “mixed husbandry.” I find myself constantly asking the question: Is it necessary in cane-farming that cane alone shall be grown? Is the cane-farmer, any more than the wheat or maize grower, necessarily and inevitably tied to the one crop? I find it difficult to believe that he is. The Colonial Sugar Refining Company enforces a clause in its contracts with tenants to the effect that, aside from forages for teams, cropping shall be limited to cane-growing. This stipulation, in my view, tends equally to the injury of the company and its tenants by enforcing single-crop farming with all its attendant evils. If farmers could be induced to grow cane in rotation with two or even one other crop, practice would quickly show in increased yields and profits the correctness of this old agricultural principle. Why should not the planter grow sweet potatoes and other vegetables as well as the fodders and fruits required in his own household? In some districts maize or even hay crops might be grown in alternation with cane, and even pigs might often be kept in numbers upon the plantation as a source of food, and as a valuable means of replenishing the manure heap. Northern planters are constantly purchasing in a large way for their own use a long list of products, from butter to hay, which to the grower would be considered extravagant. In meeting the demands of this home market the planter, not unlikely, will see the way by which he may escape from the hard necessity of growing one crop alone.

There is yet another lesson that the cane-grower will need to learn before the industry reaches an unassailable position. Under the existing system all the thought and labour of the sugar-grower are centred upon

the one cash-producing crop. The fact that it is a cash crop is confessedly the taking feature of cane-growing to experienced farmers and to novices alike. This, to my mind, fully exposes the weakness of cane-growing, considered as a permanent cultural industry. Our planters have yet to learn the lesson that American cotton-planters and wheat-farmers have learned, often through painful experiences, that the crop which gives immediate cash returns, considered alone, is, in the long run, the one which brings the farm and farmer to poverty. The turnip crop has long received recognition as the sheet anchor of British agriculture; but turnips are never included among the things sold from English farms. The immense labour involved in the growth of a crop of field turnips is returned to the farmer with interest by the sheep which consume the roots, and by the great crops of barley and wheat which the sheep farming has made possible. In like manner clover, in the agriculture of north temperature climates, is reckoned to be the most valuable of crops; but clover is almost never sold from the farm on which it is grown. The clover crop is valuable because of the milk, meat, and manure which clover gives, and because of the crops of grain which clover makes possible. It is a very simple thing to grow a big crop of cane upon freshly cleared scrub land—to harvest and sell the cane at the nearest mill; but to grow uniformly good crops at a profit, year after year, maintaining unimpaired the stamina of the land, and keeping the plantation clear of pernicious weed growth, will call into play the best energies of the practical farmer.

Cane-growing is but a part of the great trade of agriculture, and, like single-crop farming of every other sort, it alone is wanting in the elements of stability. Farming can be no more permanent than the land farmed. When cane-growing, through subsidiary crops and industries, lays hold of all the resources of the soil, the position of the great industry will not be a matter of question.

CROP AND SOIL.

What amount of manure must be returned to the soil to compensate for the loss involved in taking off a crop of 30 tons of cane per acre, supposing that the tops are left upon the land as manure? This query apparently assumes that precisely what the crop removes from the soil should be returned to it in manure. Practice, the world over, is certainly against this assumption. British farmers have long ago learned that the best results are obtained from the use of superphosphate when this fertiliser is applied to turnips, a crop deficient in phosphoric acid; while mineral manures are most useful to leguminous crops (peas, beans, clover, lucerne, etc.), rich in nitrogen, and nitrogenous fertilisers to the grasses which again are not rich in the element nitrogen. A brief study of the following tabular statement will serve to show the demands the cane crop makes upon the soil, as well as the difficulty experienced in attempting to appor-

tion manures to the supposed needs of the crop without considering *the wants of the land*:—

Composition of Mature Sugar-Cane.

Water	71.0400	Derived mostly from the air.
Sugar	18.0200	
Cellulose	9.5600	
Fatty and Colouring matters	0.3500	
Albuminous matters	0.5500	Derived mostly from the soil.
Silica	0.2064	
Phosphoric acid	0.0288	
Sulphuric acid	0.0384	
Chlorine	0.0216	
Lime	0.0480	
Magnesia	0.0312	
Potash	0.0864	
Soda	0.0096	
Oxide of iron	0.0096	

100.000

A 30-ton crop of cane will, I suppose, carry approximately 4 tons of "tops." These my correspondent has determined should be returned directly to the land. This is better far than burning, although he would have done still better with the refuse of the canefield by applying it as a manure, after feeding it to stock. A simple arithmetical calculation shows the total withdrawals from the soil of valuable manurial substances made by a 30-ton crop of cane, as follows:—

Nitrogen	58 lb.
Phosphoric acid	19.34 lb.
Potash	58 lb.

The 58 lb. nitrogen are contained in 350 lb. of nitrate of soda, or 280 lb. sulphate of ammonia.

The 19.34 lb. phosphoric acid are contained in 42.21 lb. of phosphate of lime, or 110 lb. dissolved bone.

The 58 lb. potash are contained in 107 lb. sulphate of potash, or 446 lb. kainit.

If, therefore, we give to our canefields, yielding 30 tons of cane per acre, an annual dressing of 280 lb. of sulphate of ammonia, with 110 lb. of dissolved bone, and 107 lb. of sulphate of potash or 446 lb. of kainit, we shall have exactly recouped the land for its losses due to a single crop of cane. We shall have really done something more, for the dissolved bone contains from $\frac{2}{3}$ to 3 per cent. of nitrogen, for which allowance has not been made in this calculation. It is certain that no one having a practical acquaintance with manures for the cane crop would for a moment think

of applying this formula in ordinary field operations. The amount of nitrogenous fertiliser is excessive in itself, and, judged by recognised standards, out of proportion to both the phosphoric acid and potash. This large annual dose of nitrogen would, in large part, be lost to the cane in drainage water, and its chief effect upon the crop would be seen in an excessive growth of hard milling cane, having a low sucrose content. The amount of nitrogen, as already shown, is far too great, the phosphoric acid is quite as much too small, while the amount of potash is certainly beyond the requirements of most cane soils in Queensland.

But the most serious difficulty experienced in attempting to apportion manures exactly to crop demands grows out of the fact that for a given plant, under like conditions of maturity, the mineral constituents are found in about the same relative proportions, whatever the soil may have been. It has been found, for instance, "that Virginia tobacco grown in the Royal Botanical Society's Gardens in London presented precisely the same composition as that grown in America, so that neither change of soil nor of climate had influenced the relative proportions of mineral matter and organic matter, nor those of the principal ingredients; the plant had taken from the soil of London the same materials, and in the same relative proportions, as from the soil of Virginia." If, therefore, the demands of the cane crop alone can be considered, then we must give one invariable manuring regardless of varying climatic conditions and still more varying soils.

EXPERIMENT AND EXPERIENCE.

Soils, in respect of their needs, are not unlike sentient beings. The food wants of men and animals are never met with dietaries theoretically based on the composition of their bodies, or an analysis of the forces expended by them. The wants of animals in regard to quantity and quality of food vary greatly, and are met only by a due consideration of individual wants and tastes. In a large degree it is the same with soils. Their demands can be supplied only after actual trial has shown what those needs are. To arrive at an understanding, even approximately, of what soils will consume and pay for in increased crops is far from the easy task assumed by speculative writers who counsel farmers to "experiment," and thus ascertain the weakness of their lands. There is probably no class of agricultural experiments so uniformly disappointing to the experimenter, in the results obtained, as those made with commercial or concentrated fertilisers. In very many cases, perhaps in the majority, the variation of the crop has seemed to have a doubtful connection with the varying quantities and qualities of fertilisers used. Probably quite as great differences in the yield would have been shown had the experimental areas been treated precisely alike; or, again, if they had received no manure whatever. I by no means wish to be understood by this to assert that

commercial or market manures are of doubtful utility in the canefield or elsewhere. I desire only to emphasise the fact that to restore the productive power of worn-out lands by the use of purchased fertilisers is an operation that requires sound judgment and accurate knowledge of soil and manures far beyond that ordinarily possessed by farmers. I go further, and assert that it is the business of the farmer, whatever his crops may be, to so manage his land that heroic restorative treatment is never required. If this be done, he will know from experience, with tolerable accuracy, the wants of his ground, and the practical means of supplying them. Good lands never become poor as the result of a single year's maltreatment, and lands once run down are not "restored" by a single application of manures or a single year of restorative treatment. The true and only successful way in which to bring run-down lands again into condition is to reverse the process by which their fertility was lost—that is, substitute good farming for the bad hitherto in vogue. To do this will require time, as well as the use of manure and sound methods of farming. All this leads back again to the point touched upon before—namely, that sound farming, not dosing of the land, is what is required to save it from running down or to restore it when once reduced.

The Cultivation of Chicory.

AN EXPERIMENT AT THE WINKEL SPRUIT EXPERIMENT FARM.

THE Manager of the Government Farm at Winkel Spruit reports the results of an interesting manure experiment with chicory. An acre plot was planted to this crop on 12th January last, and was harvested during August. From the following table it will be seen that 6,770 lb. of dried chicory were obtained from one acre. At the present market price of £17 per ton, this crop was therefore worth £58 10s. 10d. gross per acre. The expenses, however, of cultivation, including digging, cutting and drying without proper machinery are heavy, amounting to £17 13s., including cost of manures. There is no doubt that with a proper cutter and a drying pan this figure could be greatly curtailed. The heaviest item is that for digging, amounting to £6 11s. per acre, but it is a question whether this can be all charged to the crop, as the soil benefits greatly from what practically amounts to hand digging to the depth of two to three feet.

Some of the roots measured 45 inches in length and 3 inches in diameter at base, but the majority averaged 26 inches in length and 2½ inches in diameter.

Although the pigs would not touch the forage, the mules ate it readily. But it should not be given in large quantities, as it has then a scouring effect.

The following are the results of the employment of different manures, tabulated from 12 plots, each plot measuring 1-12th of an acre :—
MANURE SECTIONS OF CHICORY.

Plots $\frac{1}{12}$ of an acre each ; Planted January 12th ; Harvested August 5th.

Plots.	Manures.	Gross Yield.			Green Roots.		Dry Roots.	
		per acre	per plot	per acre	per plot	per acre	per plot	per acre
1	Sulphate of Ammonia ... Concentrated Superphosphate ... Muriate of Potash ...	96 lbs. per acre 120 " " 96 " "	2119 lbs. (2119) (2375)	25428 lbs. " " " "	1570 lbs. " " " "	18840 lbs. " " " "	489 lbs. " " " "	5868 lbs. " " " "
2	Sulphate of Ammonia ... Concentrated Superphosphate ...	96 " " 120 " "	(2375) (2441)	28500 " " " "	1760 " " " "	20120 " " " "	560 " " " "	6720 " " " "
3	Check plot no manure ...	...	2441 "	29202 "	1812 "	21744 "	587 "	7044 "
4	Sulphate of Ammonia ... Muriate of Potash ...	96 lbs per acre 96 " "	(2747) (2644)	32304 " " " "	2036 " " " "	24432 " " " "	653 " " " "	7836 " " " "
5	Sulphate of Ammonia ...	96 " "	2644 "	31728 " "	1960 " "	23520 " "	610 " "	7320 " "
6	Concentrated Superphosphate ...	120 " "	2874 "	34488 " "	2132 " "	25584 " "	666 " "	7992 " "
7	Check plot no manure ...	...	2482 "	29784 "	1840 " "	22080 " "	583 " "	6996 " "
8	Concentrated Superphosphate ... Muriate of Potash ...	120 lbs. per acre 96 " "	(2814) (2664)	33768 " " " "	2085 " " " "	25020 " " " "	616 " " " "	7392 " " " "
9	Kraal Manure ...	24 tons "	2664 "	24748 " "	1530 " "	18360 " "	492 " "	5904 " "
10	Basic Slag ...	204 lbs. "	2233 "	26700 " "	1655 " "	19850 " "	515 " "	6180 " "
11	Check plot no manure ...	...	2172 "	26604 "	1610 " "	19320 " "	464 " "	5568 " "
12	Kraal Manure ... Sulphate of Ammonia ... Concentrated Superphosphate ... Muriate of Potash ...	24 tons per acre 96 lbs. " 120 " " 96 " "	(2159) (2159) (2159) (2159)	23968 " " " " " " " "	1600 " " " " " " " "	19200 " " " " " " " "	535 " " " " " " " "	6420 " " " " " " " "

It will be noted that the average returns from the manured plots exceeded those from the unmanured plots by 300 lb. per acre with a value of £2 11s. This would not leave a large margin of profit, but if plots 4, 6 and 8 be contrasted with plot 7, an average gain to selected manures of 744 lb. per acre is obtained with a value of £6 6s. 5d. This use of fertilisers would be highly profitable.

Celery Culture.

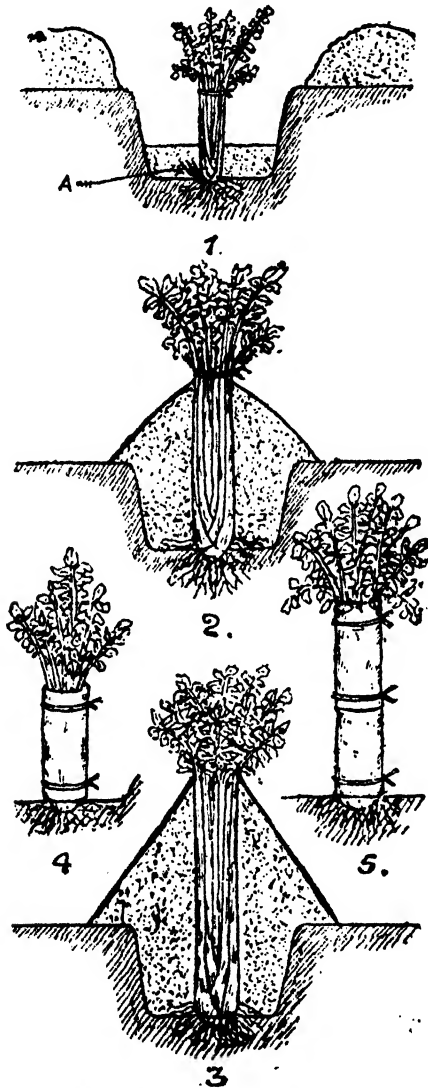
SOME HINTS ON EARTHING AND BLANCHING.

WRITING in a recent number of *Farm, Field and Fireside*, "H. R." gives some useful hints on the earthing and blanching of celery. He remarks that earthing up is a detail of considerable importance in the cultivation of celery, as the quality of the resulting sticks or heads of produce, to a great extent, depends upon the way in which this work is done. It is a mistake to earth celery too early, whilst the idea that the soil is placed round the plants for the purpose of assisting and encouraging growth is also erroneous, the main object being to blanch the sticks and bring them into suitable condition for eating.

Although some growers earth their plants at one operation, it is by far the best way, the writer continues, to earth three times, the first lot of soil being placed round the plants more for the purpose of steadying and supporting them and providing medium for new surface roots to permeate than for immediate blanching. The initial earthing should not take place until the plants are growing freely and have made a good length of stem, and, before making a start, all suckers or side shoots, as that shown by the letter A on Fig. 1, should be removed from the plants.

The soil to be used for earthing should be dry and friable, and the foliage and plants also be dry, but, if the root soil is dry, it is the best plan to give it a good watering the day before the work in question is proceeded with. Every care must be taken to prevent soil falling into the hearts and between the leaves of the plants or premature decay may set in, and, as a preventive measure, each plant should be tied together with a piece of raffia in the manner shown in Figs. 1 and 2, the tie of course being removed when the earthing is completed.

The first earthing should consist of a few inches of soil only, as shown in Fig. 1, and later, when the plants are nearly fully grown, the second earthing up be done as Fig. 2, whilst the final earthing should be as high as possible, as Fig. 3, the soil being packed as close as practicable.



3
EARTHING AND BLANCHING CELERY.
(See Article)

able to the points of the plants and made firm and even to throw off the wet. About six weeks after the final earthing, the sticks will be nicely balanced and ready for lifting for use as required, and, to ward off frost, litter or bracken covering must be provided or the hearts of the plants will quickly decay.

Another method of blanching celery is by the use of brown paper wrapping. Strips of stout brown paper from six to eight inches in width should be prepared and a piece neatly wrapped round the stem of each plant and secured with raffia, as shown in Fig. 4, care being taken to leave the ties fairly loose to provide space for growth to expand. In the course of a few weeks, when further growth has been made, a second width of brown paper must be fastened round each plant, as shown in Fig. 5, whilst a third wrapping may be necessary in the case of strong-growing, vigorous plants. When the brown paper is removed, as the produce is required for use, it will be found that the sticks are nicely balanced as well as beautifully clean.

Early celery blanched in this way does not require any earthing up, but plants for later use have to be earthed in the ordinary way to provide protection against inclement and frosty weather.

Provide a good pen and clean feeding place for the pigs. They are not half so dirty as the farmer makes them.

A small feed of whole wheat is said to be splendid for the mare in foal. Add about a handful to the regular feed.

Young sows of spring litters intended to be kept for breeding should not be confined in a pen, but given free range of a pasture, that they may grow and not get fat.

In no way can the waste milk from the dairy be used to a better advantage than by feeding to thrifty, growing pigs.

Better put up cheap rough shed in the pasture than compel the pigs to lie out exposed to the hot sun all summer.

Pigs require very little bedding during the summer. As a rule, they will thrive better with a bed on the ground, if kept dry and not allowed to become dusty.

Export of Maize and Kafir Corn.

NEW REGULATIONS FOR GRADING.

THE Right Honourable Minister of Agriculture has been pleased to approve of the following regulations for the grading of maize, Kafir corn, and jiba, intended for export from South Africa, these regulations to have force and effect on and after the 1st September, 1910:—

1. No grade certificate will be issued in respect of any consignment of grain found on examination to be wet, unripe, weevily or musty.

2. Weevily grain and wet grain which has been dried to the satisfaction of the grader will be permitted to be exported under Government supervision, but will be accompanied by a special form of certificate, which will be marked "weevily" or "wet maize dried to the satisfaction of the grader," as the case may be: provided that any consignment of weevily maize will not be shipped in a vessel carrying sound grain.

3. Grain found to be unripe or musty will not, on any account, be permitted to be exported under Government supervision, and no certificate of any kind will be issued in respect of any such grain.

4. Every bag of grain will be examined before a certificate is granted in respect of any consignment.

5. For the present export season, reputed $2\frac{1}{2}$ lb. bags may be used to contain grain, but from and after the 1st July, 1911, $2\frac{1}{2}$ lb. "A" quality twill bags only will be passed by the grader.

6. All maize rejected by the grader shall be removed from the wharf sheds not later than the fourth day after such rejection; provided that maize rejected on account of dampness may be dried by the consignee on premises to be provided by himself and at his own expense, and again offered for inspection. Such maize will, if dried to the satisfaction of the grader, be allowed to be exported under Government supervision with a special certificate as provided for in Regulation 2.

Subject to the foregoing proviso, exporters of wet maize will not be penalised (*i.e.*, such grain will be carried by the Railway Administration at the special export railway rate).

7. Graders may grant or refuse certificates under these regulations at their own discretion.

8. While all possible care will be exercised in grading, the Government will not undertake any responsibility in respect of any certificate which may be issued.

9. The following shall be the classes for grading:—

Grade Mark

MAIZE GRADES.

to be shown

on bags. Class.

Description.

- | | | |
|----|-----------|--|
| 1 | F.W.1 | To be sound, dry, plump, and well cleaned, with a maximum of together 1 <i>per cent.</i> of yellow, discoloured, or defective grain. |
| 2 | F.W.2 | To be sound, dry, and reasonably cleaned, and not containing more than 3 <i>per cent.</i> of defective grain and 5 <i>per cent.</i> of other coloured grain. |
| 3 | F.W.3 | To be sound, dry, and reasonably cleaned, and not containing more than 8 <i>per cent.</i> of defective grain and 8 <i>per cent.</i> of other coloured grain. Berries may be of irregular size and shape. |
| 4 | F.Y.1 | To be sound, dry, plump, and well cleaned, with a maximum of together 1 <i>per cent.</i> of white, discoloured, or defective grain. |
| 5 | F.Y.2 | To be sound, dry, and reasonably cleaned, and not containing more than 4 <i>per cent.</i> of defective grain, and 5 <i>per cent.</i> of other coloured grain. Berries may be of irregular size. |
| 6 | R.W.1. | To be sound, dry, and well cleaned, with a maximum of together 1 <i>per cent.</i> of yellow, discoloured or defective grain. |
| 7 | R.W.2. | To be sound, dry, and reasonably cleaned, and not containing more than 4 <i>per cent.</i> of defective grain, and 5 <i>per cent.</i> of other coloured grain. Berries may be of irregular size. |
| 8 | R.Y.1. | To be bright, sound, dry, plump, and well cleaned, with a maximum of together 1 <i>per cent.</i> of white or discoloured grain. |
| 9 | R.Y.2. | To be sound, dry, and reasonably cleaned, and not containing more than 4 <i>per cent.</i> of defective grain, and 5 <i>per cent.</i> of other coloured grain. Berries may be of irregular size. |
| 10 | F.M. | To be sound, dry, and reasonably cleaned, and not containing more than 10 <i>per cent.</i> of defective grain. |
| 11 | R.M. | To be sound, dry, and reasonably cleaned, and not containing more than 10 <i>per cent.</i> of defective grain. |
| 12 | No Grade. | To include all maize which cannot be classed in a higher grade but in dry condition and fit for shipment. |

KAIFR CORN GRADES.

K.1.	White.	To be sound, reasonably clean, and not to contain more than 5 <i>per cent.</i> of coloured grain.
K.2.	Pink.	To be sound, reasonably clean, and not to contain more than 10 <i>per cent.</i> of white grain.
K.3.	Mixed.	To include any other sweet Kaifir Corn (excluding Jiba or Jhiba) which cannot be classed under pink or white, provided it is sound and reasonably clean.
K.4.	No Grade.	To include all Kaifir Corn in dry condition fit for export (including smutty), which cannot be classed in a higher grade.

Jiba Grade.

J.	Jiba or Jhiba.	To include the variety known as Jiba, in sound condition and reasonably clean.
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Put up a box where the young colt can get at it easily and then put some oats in it daily. It will learn to eat in a very short time and the grain will greatly aid its growth.

A mare may be safely worked up to within a week of foaling, provided she is never subjected to heavy strains.

It is not a good plan to change a horse's feed too often. Oats one day, maize the next, and something else the next will soon knock out his digestion.

A sow that suckles a big litter of hungry pigs needs a great deal of nourishing feed, but some farmers never seem to learn that fact.

Skim-milk and a little grain makes good and cheap pork.

It is a bad practice to take all the pigs from the sow at once. She should be dried up gradually. Sudden weaning of a large litter from a heavy-milking sow very often produces caked udder and other troubles.

Do not attempt to raise more pigs than you can handle well, else they will eat up all the profit. Care of the pigs does not mean feeding alone, but in giving them attention necessary to keep them in good health.

Vinegar from Molasses.

By L. G. LELSY.*

SHOULD anybody ask, "What is vinegar?" one may find himself up against it for an answer as badly as Mr. Taft for a true definition of "whisky." The nearest correct answer would be: Vinegar is a very dilute solution of acetic acid containing many impurities. In this peculiar case, though, the impurities are the items that determine the quality of the product. There are known in the market four different kinds of vinegar—namely: (1) wine vinegar; (2) vinegar made from alcohol of different sources; (3) vinegar made from beer; (4) the dilute solution of acetic acid obtained from dry distillation of wood. It may be observed that the writer refuses to call this last article, no matter how cleverly it may have been flavoured and coloured, "vinegar." A man ought to be at least as particular about what he takes into his stomach as most dumb animals. The first three products are named in line, according to their quality, and therefore it seems that in a section of this country where wine is not produced, and therefore the raw material for a first-class product is absent, the manufacturing of vinegar from a cleanly obtained alcohol, during the manufacture of which the bad odours have been eliminated and desirable flavours preserved or added, such industry could become very profitable.

If we now consider the definition for vinegar given above and what was said about the impurities, it is natural to ask what are these impurities? The answer is at once easy and very difficult, "They are acetic ethers." They are found also in many fruits, as in apples, pears, and pine-apples, and give to these their aroma. They are many times carefully preserved in the alcoholic fermentation of fruit juice in order to obtain a wine or alcohol of some characteristic flavour. It is therefore clear that in the manufacture of vinegar from beet melasse all noxious odours must have been eliminated in the alcohol, and further the acetic fermentation started and maintained with some ingredient containing the fruit flavour.

The article second in importance in vinegar is the acetic acid, which is present to an amount of from 2 to 5 per cent. and gives it the acid taste, a quality that in most cases now determines the use of the article for most people, although others prefer lemon juice.

Acetic acid $C_2H_3O_4$ is the oxydation product of ethylalcohol. Pure ethylalcohol does not oxydize when it is left open to the influence of the air, nor either diluted with water.

* Specially written for the *American Sugar Industry and Beet Sugar Gazette*. We make no apology for reproducing this article here as the subject of it is one in which, we think, many of our Coast readers will be interested.—Ed.

However, if alcohol vapour is brought in contact with the oxygen from the air on platina sponge they are first oxydized to the aldehyde and later to the acetic acid. This oxydation can also be obtained when the diluted alcohol contains sufficient substances able to abstract from the air a bacillus, *Mycoderma aceti*, and to give it sufficient nourishment for its growth. This bacillus is a fungus, to be more accurate in definition, and develops itself on the surface of the fluid, where it has the faculty of producing the oxydation of the alcohol through the oxygen of the air. We have here, therefore, two distinctly different processes, which result in the same product, one purely chemical, the other physiological, and again it will be found, as in many other cases, that the product which has its origin in nature is the best to our taste. Naturally in late years this process therefore has been closely watched by scientists working along these lines, the fungus eliminated and pure cultures cultivated by Pasteur. Limits of dilution for the raw material and most favourable temperatures in the manufacturing process determined.

It seems therefore not out of place to give in short an outline of this process. For the converting of wine into wine vinegar use is made of caken barrels containing a mixture of vinegar wine and vinegar mother (which after all mainly consists of *mycoderma*). These barrels are placed in a room where a temperature of + 25 degs. C. is maintained. When once the acetic fermentation has started, from time to time is more wine added to the barrel, and after a couple of weeks sufficient alcohol has been oxydized. When the barrel becomes too full the vinegar may be let off from the bottom and such barrels used over and over for a long time until the incrustation of tartar and other salts makes it necessary that they should be cleaned. This process requires, of course, considerable time and therefore a way of manufacturing has been adopted which is by the trade called the "quick method." By this method most vinegar obtained from alcohol is manufactured.

For this process is constructed a wooden vat, dimensions from 2-4 m. high and from 1-1.5 m. in diameter. About 15-20 cm. from the bottom of the vat a row of holes has been drilled, which allow entrance of the air. A peculiarity of these holes is that they are always made so that the hole on the inside is a little lower than on the outside. Also this part of the vat is provided with a syphon constructed with a double bent so that the inflow reaches nearly to the bottom of the vat, while the outflow allows a column of about 10-12 cm. of vinegar to remain in the vat. Above these 20 cm. is a perforated loose bottom. On this bottom shaving curls of red beachwood are piled until nearly filling the whole vat. The theory of long chips in the diffusion cell holds its ground also in this process, the long curls promoting the most satisfactory percolation. Some 10 cm. from the top of this mass of curls is another perforated cover with small holes.

Through each of these holes is a small piece of loose rope held in its place by a knot. About 15-20 cm. above this perforated plate is the cover proper, which is provided with one hole for the inlet of the alcoholic solution and another to give entrance for a tube reaching below the perforated plate for escape of nitrogen gas. For the operation the beachwood curls are soaked with warm essence of vinegar and when sufficiently penetrated the diluted alcohol solution is added through the inlet in the cover proper. In the manufacture of cheap vinegar, a mixture consisting of a certain percentage of alcohol, beer, *must* and water generally is used, but for a better grade, use frequently is made of the extract obtained from the remains of a wine press, which have already by nature gone over in acetic fermentation. Further, the physiological formation of the *mycoderma* cultures is benefited by the presence of phosphates of the alkalis which may be added in the form of potassium or magnesium phosphate in very low percentage to the raw material, before it is taken in the process of manufacture. Care must be taken that the vat, and especially the perforated cover with the little ropes, is lying on a perfect level in order to secure equal percolation over the largest surface. The fluid is taken up by the little ropes and drips so on the beachwood curls. Through the action of the vinegar present in these curls and the maintenance of a current of air through the lower holes in the vat the alcoholic liquid is converted into vinegar and assembles in the lowest partition of the vat, where it may run off through the syphon. It is then given its colour through the addition of caramel and its flavour in different little ways secret to the trade.

The vats are placed in a room with a temperature of + 25 degs. C. and is itself provided with a thermometer in order to control from the outside the temperature of the mass inside, which naturally rises during the oxidation of the alcohol. This rise in temperature provides at the same time for the constant entrance of a fresh supply of air, because the warm air rising to the top produces a current through the lower holes. The temperature must be kept in hand because otherwise considerable alcohol and acetic acid will escape with the nitrogen, and even the oxydation would go on to carbonic acid and water.

In this way from 1 gallon of dilute alcohol may be produced 13 gallons of 3 per cent. vinegar, not counting a permissible loss of + 10 per cent. This, however, may reach 50 per cent. loss if the process is in the hands of a layman.

Keep the drinking vessels filled with fresh water. More or less food escapes from the beak of the little chick while drinking. This food soon becomes sour in the warm weather, and the water is foul.

How to Destroy English Sparrows.

By NED DEARBORN, *Assistant, U.S. Biological Survey.**

IN its economic relations the English sparrow among birds is comparable to the rat among mammals. It is cunning, destructive, and filthy. This sparrow was introduced into America about sixty years ago, and is now distributed generally over the eastern half of the United States and southern Canada and locally westward to the Pacific coast. This rapid dissemination is a result of the bird's hardiness, extraordinary fecundity, diversity of food, aggressive disposition, and almost complete immunity from natural enemies through its sagacity and its preference for thickly settled communities.

Its natural diet consists of seeds, but it eats a great variety of other foods. While much of its natural fare consists of waste material from the streets, in autumn and winter it consumes quantities of weed seed, and in summer numerous insects. The destruction of weed seed is undeniably in the sparrow's favour. Its record as to insects is not so clear. There is substantial evidence that it eats certain harmful insects quite freely when these are abundant, but that it habitually seeks insects, or that it prefers them to seeds or other vegetable food, is not borne out by the evidence. Out of 522 English sparrow stomachs examined by the Biological Survey, 47 contained noxious insects, 50 contained beneficial insects, and 31 contained insects of little or no economic importance. This report shows conclusively that, aside from the destruction of weed seed, there is very little to be said in the sparrow's favour.

On the other hand, much can be said against the bird. It destroys small fruits, as cherries, grapes, pears, and peaches. It also destroys buds and flowers of cultivated trees, shrubs, and vines. In the garden it eats seeds as they ripen, and nips off tender young vegetables as they appear above ground, peas and lettuce being especially subject to attack. It damages wheat and other grains when newly sowed, ripening, and in shocks. It reduces the numbers of some of our most useful native species, such as bluebirds, house wrens, purple martins, tree swallows, cliff swallows, and barn swallows, by destroying the eggs and young and by usurping the resting places. It attacks other familiar native birds, as the robin, wren, red-eyed vireo, catbird, and mocking bird, causing them to desert parks and shady streets of towns. Unlike our native birds whose places it usurps, it

* English sparrows are becoming increasingly a nuisance in Natal and the information contained in this article—published originally as a U.S. Farmers' Bulletin—will we think be found of value by those of our readers who are troubled with this pest. — Ed.

has no song, but is noisy and vituperative. It defiles buildings and ornamental trees, shrubs, and vines with its excrement and with its bulky nests.

The evidence against the English sparrow is overwhelming, and the present unfriendly attitude of the public toward it is reflected in our State laws. Nowhere is it included among the birds that are protected. In response to frequent inquiries for means of abating the sparrow nuisance received by the Biological Survey, a few approved methods applicable to different conditions are here described.

Sparrows frequently give annoyance by roosting in ornamental vines and in crevices about buildings. If driven out late at night, several nights in succession, they will usually desert the roost. A jet of water from a garden hose is a potent disturber, particularly on frosty nights. Where water is not available, small Roman candles may be employed.

Though sparrows may be driven from a given neighbourhood, the relief thus obtained is only temporary, and has the further objection that the nuisance is simply transferred elsewhere. More drastic action is therefore preferable.

PREVENTION OF INCREASE.

The most effective method of preventing the increase of sparrows in a locality is to destroy their nests at intervals of ten or twelve days throughout the breeding season. Occasionally they build large covered nests in trees, but as a rule they build open nests in bird houses, electric-light hoods, cornices, waterspouts, and similar places. While it is often difficult to reach nests with the hands, they can usually be torn down by means of a long pole having an iron hook at the tip. By a concerted and continued movement to destroy every nest after the eggs are laid, English sparrows in any locality may be gradually reduced without resorting to shot or poison.

METHODS OF DESTRUCTION.

A sparrow's habit of nesting in cavities can be turned to account against it. By providing one-room bird house, or even packing boxes or tin cans, and putting them in trees or on poles or buildings at a height of about 10 feet, the birds may be captured after dark with the aid of a long-handled net. This net should have a deep bag and a small hoop made to fit the front of the boxes closely. After the net has been quietly placed over the entrance, a few raps on the box will send the tenant into it. Dilapidated buildings may sometimes be fitted up for catching sparrows in this way, as well as for destroying their nests and eggs. An ordinary wooden box may be nailed to the inside of the building over a hole made to admit the sparrows. The box should be arranged so that the top or upper part of the back can be lifted to gain access to the inside.

A box may be designed to be hung on a building or a tree. Its floor should be about 6 inches square and its height at the eaves about 8 inches.

The roof should be hinged at the top for removing the eggs or young. Such boxes may be built of rough boards at slight cost. By distributing a number of them about orchards, shade trees, and out-buildings, and catching the sparrows that occupy them, or by destroying eggs, the work of extermination may be carried on at a season when other methods are least effective.

BAITING.

Preliminary to the following destructive measures, sparrows should be baited until they are attached to the spot selected for their execution. Seeds, grain, or waste from the table, if supplied regularly, will soon establish a feeding place. If a general campaign is to be undertaken, enough such feeding places should be maintained to attract to them practically all the English sparrows in the neighbourhood. This can easily be done in winter when food is scarce. After thus baiting the sparrows they may be trapped, shot, or poisoned.

TRAPPING.

Traps alone are inadequate to exterminate sparrows, but a reduction of numbers can be effected by using a shallow box not less than 4 feet square, open on one side and covered with woven wire on the other. One side of this trap rests on the ground, while the opposite side is supported by a stick 18 inches long. Near the upper end of the stick is attached a long cord, and between the top of it and the edge of the trap is placed a chip. By setting the trap over bait and pulling the cord from a sheltered point of observation when a flock of sparrows is beneath it, numbers of them may be caught. Instead of the box described above, by which the birds are taken alive, an old door or similar device may be employed as a deadfall. In either case the trap door should be kept set and baited until the sparrows are not afraid to go under it. The best time for trapping is just after a snowstorm, when the birds have been fasting. Then, if the ground be cleared and chaff and grain be put under the trap, the birds will crowd in and enable the trapper to secure nearly all of the local flock. If any escape they will spread the fear of traps, and before long very few of the birds can be induced to go into one.

SHOOTING.

Sparrows are accustomed to feed in close flocks, and when thus assembled a large number can be killed by a charge of No. 10 shot. The best way is to scatter grain over long, narrow areas and shoot the sparrows at these baiting places. Where sparrows infest poultry yards, the bait may be placed on a horizontal board, supported at such an elevation that the birds can be shot without danger to the poultry.

UTILISATION OF SPARROWS FOR FOOD.

Since English sparrows are a pest and a reduction of their numbers is important on economic grounds, there would seem to be no reason why the birds, when trapped or shot, should not be utilised for food in this country, as they have been in the Old World for centuries. Their flesh is palatable and nutritious, and in city restaurants they are often served under the name of reed birds.

POISONING.

Where the use of poison is not prohibited by law, it may be effectively used to reduce the number of sparrows. Of the different poisons tested, the most satisfactory is strychnia sulphate. It is easily prepared and acts quickly. Wheat has proved to be a good bait, as well as an excellent vehicle for administering the poison. The grain should be regularly supplied at the baiting stations until the birds have become accustomed to resort to the place. A good time to put it out is early morning, as the birds are sure to be hungry for breakfast. The capacity of the sparrow's crop and stomach is about 30 kernels of wheat, varying more or less according to the size of the kernels. In deciding the amount of poisoned wheat to put out at one time, it is well to estimate the number of sparrows frequenting a feeding place and to allow about 20 kernels for each sparrow. Although 2 kernels of wheat coated with the solution described below have been known to kill a sparrow, 6 or 7 kernels are required to insure fatal results. Only as much poison should be put out as is likely to be eaten in one day, as exposure to moisture reduces its virulence. Furthermore, sparrows that take less than a fatal quantity, or that become frightened by the death of comrades, will forsake a feeding place if poison is kept there constantly. It is better, therefore, to supply unpoisoned wheat after each poisoning until the birds have recovered confidence. An important advantage in having several feeding grounds is that they may be used in rotation, the sparrows forgetting their fear of one while the others in turn are receiving poison.

A poison mixture that has proved very effective is prepared as follows: Put one-eighth ounce of strychnia sulphate into three-fourths of a gill of hot water and boil until dissolved. Moisten $1\frac{1}{2}$ teaspoonfuls of starch with a few drops of cold water, add it to the poison solution, and heat till the starch thickens. Pour the hot poisoned starch solution over 1 quart of wheat and stir until every kernel is coated. Small-kernelled wheat sold as poultry food, if reasonably clean, is preferable to first quality grain, being cheaper and more easily eaten by the sparrows. A 2-quart glass fruit jar is a good vessel to mix in, as it is easily shaken and allows the condition of the contents to be seen. If the coated wheat be spread thinly on a hard, flat surface, it will be dry enough for use in a short time. It

should be dried thoroughly if it is to be put into jars and kept for future use. Dishes employed in preparing poison may be safely cleansed by washing.

The poison should be well scattered, so that many birds may be able to partake at the same time, since after a few are effected their actions excite the suspicion of their comrades. Usually a few sparrows get only enough strychnine to paralyse them for a few hours, after which they recover. It is important, therefore, to visit the feeding places two or three hours after distributing poison to prevent such birds from escaping. It is well also to remove dead birds promptly to avoid exciting the suspicions of those that are unaffected. In northern latitudes the best time to put out poison is just after a snowstorm, when food is covered. The feeding place should be cleared of snow and the poison laid early in the morning.

Sparrows should be baited in secluded places, safe from interruptions and where doves and poultry are not endangered. Roofs, back yards, and unusual poultry runs are favourable situations. Proximity to low trees, grape arbours, and similar retreats has the advantage that sparrows go to such places between meals, and many dead birds will be found there well away from the bait. If undisturbed, poisoned birds will usually be found within a few feet of where the bait was spread, death occurring in from three to twenty minutes. Where doves or poultry are likely to be poisoned, the sparrows, after being baited, may be induced to feed in small covered pens made of coarsely meshed wire netting and having the sides raised about an inch and a half above the ground. There is practically no danger that cats or other animals will die from eating sparrows that have been poisoned. Any wheat coated by the above process which is overlooked by the birds, will become harmless after a few rains.

Sparrows can be reduced locally to almost any desired extent by the methods outlined in this bulletin, but it should not be forgotten that such reduction can be made permanent only by systematic and continued efforts.

Never work a team of colts together until they have been thoroughly broken, for they will annoy each other.

Blend the feed carefully with proper proportions of starch, fat, and nitrogenous matter. Fine birds cannot be reared on a badly-balanced rations.

Keep your hen-house cool during the summer, but avoid draughts. Roosting in a draught has sent many a promising youngster to an untimely grave.

Among the Farmers.

THE ASSOCIATIONS DURING THE MONTH.

** * The attention of secretaries of agricultural societies and similar bodies is drawn to this section of the Journal, which has for its object the publication of reports of farmers' meetings, annual reports, presidential addresses, etc.; and it is hoped that full use will be made of the facilities here offered for the dissemination of news regarding such doings of the many associations all over the Province as are likely to prove of general interest to readers of the Journal. In forwarding copies of presidents' reports, etc., correspondents are respectfully requested to make sure that they give the date of the meeting on the occasion of which the address was delivered or report read.*

UPPER BIGGARSBERG.

The annual general meeting of the Upper Biggarsberg Farmers' Association was held on the 1st September, when the following address was delivered by the retiring President (Mr. W. L. Oldacre):—

Many changes have taken place since we last held the annual general meeting of this Association. Death, which has been more than usually busy in the year made memorable by the reappearance of Halley's comet, has removed from our membership no less than three well-known members, whose loss we deplore. A new sovereign has ascended the British throne and we have entered upon a fuller national life in the consummation of the Union of South Africa. The control of matters agricultural has passed from the tender mercies of the late Natal Government into the hands of General Botha, to whom we look with confidence to establish in Natal a more satisfactory state of affairs than has obtained for the last few years, and especially so as regards the campaign now to be initiated to fight East Coast Fever.

Your President and Mr. Wiltshire attended the meeting of the Natal Agricultural Union held in Maritzburg last April, the principal business at which was, as usual, Tick Fever. Your President also, at the request of the Central Advisory Board, was one of the delegates who met General Botha at Maritzburg at the East Coast Fever Conference held there.

It is with regret I have again to report a more or less unsatisfactory twelve months since our last annual meeting, in which drought has been the outstanding feature. It is now fully six months since rain fell in the greater part of the district embraced by the Association, and as a conse-

quence of this the mealie crop was in most instances considerably below the average, apart from which the prices ruling for this staple crop of the district have been and are very discouraging. The summer potato crop turned out well on most farms, but those planted in the early part of the year fell a prey to the blight, in addition to which the potato moth was more than usually active.

Many complaints have been expressed about the manner in which table potatoes have been delayed owing to the apparently excessive zeal of the Transvaal inspectors in rejecting unsound tubers, and I noticed that the Chief of the Transvaal Agricultural Department has promised to give this matter his careful attention. One could hardly blame them for guarding against the introduction of unsound seed, but that table varieties should undergo such very close scrutiny appears needless to the ordinary individual. East Coast Fever is still the great drawback to the prosperity of the district, though in the opinion of many this cloud has now developed a silver lining. Continuous dipping at close intervals with arsenical preparation has proved that even the infected tick can be rendered innocuous, and that without any harm ensuing to the cattle, and it is with gratification I note that dipping tanks are being put down in many cases where the number of cattle require and justify them. The policy now initiated by General Botha also gives one a feeling of confidence that at last a little common sense will be employed in the measures taken to combat this disease.

Sheep during the summer and winter did well, but now the lambing season is here without adequate food for the ewes, it appears certain enormous losses will be suffered from their starvation. Owing to the absence of rain in the autumn and late summer, it proved impossible to make adequate provision for a dry spring.

Paspalum is proving itself a drought-resister, but even that has only ventured to put forth a blade of green here and there as if in protest against the inadequate supply of moisture.

Large quantities of fertilisers are now purchased for this district, and a few remarks on this subject may not be amiss. At our last annual meeting it was hoped that the Weenen Phosphates were going to prove the salvation of the cereal grower, but unfortunately this has not proved the success that was prophesied for them. I have only heard of one case locally in which the man was satisfied with the resulting crop. In this case the phosphates were mixed with kraal manure and allowed to sweat, when the mixture was turned over; this operation was repeated several times. Where sown with the grain without any previous treatment a *nil* result was, I think, always the case.

The following extract from the *Transvaal Agricultural Journal* may be thought interesting:—

"From what I have seen of the fertiliser trade in this country I am convinced of the necessity for each farmer to be able to safeguard his own interests in buying manures, particularly the mixed or special fertilisers. The means are very simple. The first requirement is that he should not set about it in a hurry, but should begin well in advance of the season for which he requires the manure. He must then demand a written guarantee with the manure that it should contain not less than such and such a percentage of nitrogen, phosphoric acid or potash, whatever it is alleged to contain. This would be greatly assisted by a law compelling the vendor to supply this guarantee with the manure on demand, as is the case in England, on the Continent, and in America. Failing the prompt accession to this request, he should avoid buying from the firm in question." Again: "The farmer's first object is to see what sort of value he is being offered for his money."

The Natal Co-operative Mealie Growers' Union, of which I trust many of you are members, has, since the subscription was lowered to 10s. per annum, obtained a largely increased membership, and those who are not now members would be well advised to join. Through this Union you can purchase your manures with a guaranteed analysis at bed-rock prices, and thus save many times your subscription, which also gives you the right to export your mealies through it with a generous advance on the selling price on shipment at the port.

Many experiments in growing Soya beans will be made this season, and if successful this should prove a valuable crop to grow in rotation with mealies, and I strongly advise members of this Association to endeavour to put in a trial plot. A mixture of Soya beans and mealie meal with roots and chaffed hay would make an ideal winter feed for dairy cows and for fattening cattle.

Labour is every year becoming more difficult to obtain, and should the indentured Indian supply fail us it is difficult to see where a reliable supply of coloured labourers is to be obtained. The competition of the coal mines in the local labour market is such that the farmer is quite unable to compete, and the Rand rate of wage proves too inviting a bait for the native to resist for long. The native labourer living on the home farm is an almost intolerable nuisance. His women folk search the farm from one end to the other to pick up the fertilising matter for fuel and his goats are not satisfied until not a tree or a shrub remain intact, and then in the usual short ploughing season he expects to stay at home and make a pretence of putting in his crops, for which he requires your plough and cattle.

One of the great needs of the farmer who grows an average acreage of mealies is a good sheller of moderate capacity for power. I do not know of a single one that would prepare the mealies sufficiently well for

export oversea. There is also a great want of thoroughness in the way many shellers are put together, tin tacks and wire nails being used in inconspicuous places. I do not think any farmer would grudge an extra pound or two if he could rely on obtaining a really satisfactory and honest machine. He would then avoid the continual irritation caused by the necessity to purchase spare parts at excessive prices.

In conclusion, I thank the Secretary for his labours and the committee and members for their attendance at the meetings. I trust that the incoming office-bearers and the Association generally may experience a more prosperous year than this last has proved to be, and I believe that, given a speedy conclusion to the present drought, such will be the case and we shall have our share of that prosperity that appears to have arrived in the Union of South Africa.

NATAL POULTRY CLUB.

THE annual general meeting of the Natal Poultry Club was held in the committee-room of the Maritzburg Town Hall on Monday evening, the 15th September, when there was a very large attendance, presided over by Mr. F. Chapman.

The Secretary (Mr. E. Guy Blundell) read the minutes of the last annual meeting, which were confirmed.

SECRETARY'S REPORT.

The Secretary's report of the annual Show was as follows:—

The Show was conducted on similar lines to the Show of last year, *viz.*, that it was held in conjunction with the annual show of the Royal Agricultural Society, which is to our mutual advantage. The poultry section was undoubtedly the feature of the Show, but in future years we must have more staging accommodation and pens. There was one regrettable incident in the lateness of the arrival of pens hired from the Durban and Coast Poultry Club, but the latter are in no way to blame. The pens in question, I am informed, were despatched in ample time, and the delay rested entirely with the Natal Government Railway. A fact which must not be overlooked was that all the overberg, coast, and up-country exhibits were despatched on the evening of the second day of the show, and only one complaint was received reporting the delay of the arrival at their destination. The case was investigated, and the N.G.R. were the culprits in this instance. The entries totalled 1,091, against 807 of last year, which constitute a record, and not one of these were cross entries. Wyandottes, Orpingtons, Leghorns, Rocks, and Minorcas were the classes most strongly represented in the order shown, and amongst these some most beautiful specimens were exhibited, in fact the general remarks

were that never before had such quality been staged in such numbers. The Lord Methuen Cup, known as the Governor's Cup, drew 24 entries in the shape of breeding pens, against 21 of last season, and here again were some lovely and typical specimens. The winner was Mr. W. H. Squires with a beautiful pen of Buff Orpingtons. The selling classes were also well supported; and the number of birds which changed hands constituted a record far above anything we as a club have ever had before. Many birds were claimed at £5 5s., which, to my mind, is most satisfactory, and shows that the fancy is being taken up by an even greater number of enthusiasts. It is a well-known fact that should one have birds for disposal and require first-rate prices, exhibit them at the show of the Natal Poultry Club and the sale is invariably effected. I think it advisable in future to make an annual show one of three days instead of two, as many intending purchasers visited the Show on the third day to find a majority of the exhibits had been removed. The South African Fantail and Pigeon Clubs held their shows in conjunction with our own, and here again were some beautiful birds. I must congratulate Messrs. Meeser, Oliver, and De Haas upon their successes in this section. The canaries were a very nice lot indeed, and Messrs. Harold Clarkson and Fuller, who had the judging of this variety, remarked that they were delighted to see this section was fast becoming so popular with many keen adherents. The cup for the best caged bird on show was won by Mr. H. J. Puzey. Never before have so many specials been awarded at any one Show, the list totalling 108. A great feature was the awarding of sixteen settings of pure bred eggs. When we take into consideration the amount of work the judges had to perform, we must congratulate them. It is a regrettable fact that Mr. F. Chapman, our president, was suffering from a severe attack of influenza at the time of the show, and could not devote the energy he is known to possess and display on such occasions. The committee worked like Trojans with one or two exceptions, and had it not been for their valuable assistance in penning and despatching the exhibits, the Show would not have been classed the success it was. This is the first season that a S.A.P.A. representative has been appointed to our Show, and the gentleman in question, Mr. Jas. Fletcher, did his duty, which was an onerous one, to the satisfaction of all concerned. The following is a list of the winners of the many cups presented:—Governor's Cup, Mr. W. H. Squires; the Payne Challenge Cup, Mrs. Woodburne; the Vice-President's Gold Medal (to go to the winner of the Payne Challenge Cup), Mrs. Woodburne; the President's Rose Bowl, Mr. B. A. Ireland; the Munro Miller Piece of Plate, Mr. J. B. Shanks; Challenge Cup for the best Colonial-bred Fowl on Show, Mrs. Woodburne; the Committee Cup, Mr. G. H. D. Neaves; Vice-President's Cup, Mr. D. M. Dixon; Fancy Pigeon Cup, Mr. D. de Haas; the Flying Cup, Messrs. Knapp and Stowell;

the South African Fantail Club Challenge Cup, Mr. J. Gordon Carbis; the Dykes Silver Cup, Mr. J. Gordon Carbis; the Porrit Silver Cup, Mr. J. Gordon Carbis; the Peters Silver Cup, Mr. A. R. Oliver; the Broadbent Silver Cup, Mr. D. de Haas; the Holmes Silver Cup, Mr. A. R. Oliver; the Gough Silver Cup, Mr. D. de Haas; the Cage Bird Silver Cup, Mr. H. J. Puzey. On behalf of you, gentlemen, I take this opportunity of thanking the following judges who so kindly officiated:—Messrs. W. Dixon, W. Chapman, C. Baylis, J. E. Servant, D. M. Dixon, G. H. D. Neaves, W. Sandeman, J. C. Cope, W. P. Gough, F. A. Smart, R. Fuller, H. Clarkson, and Bendzulla, who acted for Mr. Munro Miller, the latter gentleman having been confined to his bed by order of his medical adviser. The fact that Mr. Bendzulla so generously and ably stepped into the breach must command the thanks of all concerned. I thank, on behalf of the Club, the many donors who subscribed towards the funds of the Club and specials. Mr. Laurence, of the Government Experimental Farm, has done much to advocate a laying competition in Natal, and this should be an accomplished fact before the end of next season. The other Natal clubs will co-operate, I feel sure, and make the venture a success. In conclusion, I have great pleasure in stating that the Show financially was a success, as the balance-sheet of the treasurer will show.

The Show report was carried unanimously.

SECRETARY AND TREASURER'S REPORT.

The Secretary and Treasurer's report for the year was as follows:—

In submitting to you the 26th annual report of the above Club for the year ending August 31st, 1910, I intend to deal with the Club's position inclusively, having already dealt with matters regarding the annual Show under a separate report. The Club financially is very sound, which is borne out by Mr. Prior, the hon. secretary's, balance-sheet, which shows very few outstanding debts, practically no liabilities, and a bank balance of about £30. It will be impossible to hold further shows unless more pens and staging accommodation be secured, and I think that if the Royal Agricultural Society be approached with this end in view these obstacles will be removed. The Society in question has rendered every possible assistance to us in the past, and they will, no doubt, continue to do so in the future, the relations existing between the Royal Agricultural Society and the Natal Poultry Club being most cordial, and, although the poultry hall was limewashed and extra benching erected this season for the Show, the accommodation was insufficient. We owe Messrs. D. C. Dick and Duff, of the Royal Agricultural Society, much gratitude for their valued assistance. Club rules must be revised at the annual general meeting, as there are no copies for promulgation amongst members. Members at the end of last season numbered 64, and to-day we must congratulate ourselves on

a membership of 114, which is evidence to the fact that the poultry fancy in Natal is strongly gaining favour. Much credit is due to an energetic Committee, who have interested themselves on behalf of the novice, and so enrolled members to such a number; 4,668, or 389 dozen, S.A.P.A. rings have been ordered for members this season, which shows that fanciers at last realise the advantages to be derived from ringing. It is gratifying to note that the working of the S.A.P.A. has proceeded well during the current year, and the Committee of Management have worked conscientiously and well, being ably served by a most excellent and energetic secretary in the person of Mr. F. T. Hobbs, and I think I am safe in saying that the Association has obtained the authority so essential for the adequate control of clubs in general. In all, there have been 11 committee meetings, which have been remarkably well attended, with an average of 14 at each meeting. A register of attendance is open for inspection by members upon application to myself. The treasurer's report and balance-sheet which is now in the hands of the auditor, will be ready for promulgation at the annual meeting. In conclusion, a word of appreciation must be extended to our president, Mr. F. Chapman, who, with always the interest of the Club at heart, has done much to popularise the fancy amongst residents of Natal.

TREASURER'S REPORT.

The treasurer, Mr. A. Prior's, report was read as follows:—

The statement of accounts shows that the year commenced with a balance in hand of £10 14s. 6d. The total receipts from all sources are £350 15s. 4d., and expenses £326 18s. 7d. Old accounts amounting to £9 5s. have been paid, leaving a balance on hand of £32 16s. 9d., as compared £10 14s. 6d. last year. You will notice the statement shows the Club to be in a good position. Part of the £17 2s. 6d. outstanding has been paid since the books were closed, and the Club is to be congratulated on having £57 17s. 2d. assets over liabilities. In closing the above report I would suggest to the Club that in future the secretary hold the post of secretary and treasurer. If this is done I am sure the clerical work of the Club will be more efficiently done in the future.

The Chairman, in moving the adoption of the reports and balance-sheet, said that he thought the Club was to be congratulated on the extremely satisfactory state of affairs this year. It had been a good many years since they had had such a satisfactory balance, and they were that day on a very firm footing. The secretary had dealt with matters of interest that had come up during the year in addition to the shows, but he thought it advisable that he should make a few comparisons. Last year the subscriptions were £64, as against £96 this year. The ring account was £21, against £26 this year. They had to bear in mind that seven-eighths of

the rings this year were of the cheaper make—half the price—so double the number of rings had been bought this year. Entrance fees last year had been £71, and this year they were £92. The expenditure had been, in prize money, £107 last year, and £156 this year. The secretary had done remarkable good work for them, which had increased since the affiliation to the S.A.P.A.

Mr. A. J. Peters, in seconding the adoption of the report, said that it was due to the secretary and chairman that the year had been such a successful one. With regard to more accommodation at the Agricultural Show, the matter had been brought up by the Society, and he thought that he could promise them that if delegates went from that club the Agricultural Society would give them all the assistance possible. Their thanks were also due to the treasurer for having presented such a satisfactory balance-sheet.

The reports were adopted.

Messrs. W. Ashton, A. Rafter, and S. O. Samuelson were elected new members.

The election of office-bearers resulted as follows:—President, Mr. A. Lawrence; vice-presidents, Messrs. W. Chapman, A. J. Peters, and W. P. Gough; secretary and treasurer, Mr. E. Guy Blundell; committee, Messrs. J. McKenzie, W. Sandeman, T. Johnson, J. Borain, G. H. D. Neaves, B. A. Ireland, E. Shackleford, D. Wilkie, A. Prior, C. Baylis, H. J. Puzey (representing cage birds), A. H. Arnold, and J. G. Carbis (representing the pigeon section); auditor, Mr. C. Baylis.

After some discussion, during which it was pointed out that it would be advisable to combine the offices of secretary and treasurer, Mr. Blundell was appointed.

The matter of amending the rules was left over to an adjourned meeting.

It was decided to hold one young bird show this year, and this was also left to the adjourned meeting, so that the replies from other clubs regarding the matter would have been received.

It was proposed by Mr. D. M. Dixon, seconded by Mr. F. Chapman, that an honorarium of ten guineas be given to the secretary (Mr. Blundell) for his services during the past year. Several members spoke in appreciative terms of the hard work that had been done by the secretary. This was passed unanimously.

Mr. Blundell, in reply, thanked the Club, and said that it would be getting some of his own back, as he had lost something like £8 on the year's working.

The following were elected judges in accordance with a circular from the S.A.P.A.:—Mr. J. Borain, games, all varieties, and Malays; Mr. G. H. D. Neaves, all varieties Mediterranean.

On the motion of Mr. Withycombe, the meeting adjourned until October 7th, with a vote of thanks to the chairman.—*Times of Natal*.

NEW HANOVER.

The annual general meeting of the New Hanover Agricultural Association was held at the Agricultural Hall, New Hanover, on Wednesday, 14th inst., at 11 o'clock forenoon.

Mr. G. C. Mackenzie, J.P., Buccleuch, the retiring president, occupied the chair.

Mr. Mackenzie's report for the year was as follows:—

"The Association is now in its seventeenth year, and there are at present 82 members on the roll.

"During the year just ended, we have held six general meetings and several committee meetings.

GOVERNMENT GRANT.

"The Government grant of £100 paid to us in aid of our funds assisted us materially in carrying forward the affairs of the Association.

GEM TREES.

"A demand having sprung up by buyers for the purchase of gum trees, it was thought a good time to dispose of some of those growing in our grounds, and tenders having been called for, 40 of the trees were sold for £27 15s., payment of which has been received.

SHOW.

"Owing to various drawbacks, of which you are all thoroughly well acquainted, we have for several years been precluded from holding a show. This year it was felt that the time had arrived when we should make a fresh start. An enthusiastic committee was formed, and a show was held on 18th August, which was an undoubted success, notwithstanding the inclemency of the weather on the day of the Show.

"His Honour Mr. Charles J. Smythe, the Administrator of Natal, was kind enough to come out from Pietermaritzburg to open the Show, and it was quite like old times to have him with us again.

"The entries, though not so large as at the last Show we held several years ago, were very good indeed.

"When the prize list was being framed it was thought that owing to transport difficulties, it would assist exhibitors bringing exhibits to the Show, if the weight of each exhibit of mealies, etc., in production section 1 were reduced to 25 lbs.

"Exhibitors were therefore required to exhibit only 25 lbs. of mealies and the like. Considerably less space was thus taken up in the hall than was the case in previous years when a muid of mealies was required as the quantity of the exhibit. The result this year was that owing to the smallness of the size of the exhibit the hall had rather an empty appearance.

"We are now, by means of mules and donkeys, better able to cope with transport difficulties, and I think that when we hold our next Show it would for various reasons be well to revert to the old system of requiring exhibitors to exhibit a muid of mealies instead of only 25 lbs. weight of same.

"The exhibits in the manufactures and dairy produce section were exceptionally fine, and the ladies, whose handiwork was most apparent in that section, deserve all the credit they got for the splendid display.

"The silver cups offered as special prizes were won as follows:—

"Mr. Edwin Peckham's silver cup for the greatest number of points gained throughout the Show was won by Mr. F. E. Bentley, Sproxton, York; Messrs. W. Merriek's silver sup for the greatest number of points in the manufactures and dairy produce section was won by Mrs. F. E. Bentley, Sproxton, York; Mr. H. Jacobson's silver cup in the tent pegging competition was won for the current year by Mr. W. Hohls, of New Hanover.

STEAM PLOUGHING.

"During the past year we had an opportunity of hearing at one of our meetings a most interesting and instructive address by Mr. McLaren, the representative of Messrs. John Fowler & Co., Ltd., on the subject of steam ploughs. Steam ploughing is but in its infancy in South Africa, but one cannot help feeling that there is a great future for it.

SOY BEANS.

"The attention of farmers has of late been directed to numerous articles appearing in the public Press, having reference to the cultivation of the leguminous plant known as the soy bean. It is said to be easily cultivated, to be drought-resistant, to be able to withstand excessive moisture, and that the purposes for which it can be used are numerous. It is also said that oil manufactured from it can be used with great success in the manufacture of soap. Most farmers will no doubt think it worth while to plant during the spring at least a small plot as an experiment.

FINANCES.

"I am very pleased to be able to say that the finances of the Association are in a sound condition. It will be seen from the Treasurer's state-

ment that there is a credit balance in hand of £97 9s. 9d. It will rest with the Association to decide what portion of that balance, if any, should be applied in reduction of the account of the bond over the hall.

"I thank the office-bearers and members of the Association for the courteous assistance they have given me during my tenure of office, and it is my sincere wish that the Association will long continue in its present prosperous course."

Mr. Mackenzie was cordially thanked for his report, which was adopted.

The meeting then proceeded to elect office-bearers for the ensuing year.

Mr. Edwin Peckham, J.P., Summerhill, was elected President, and thereupon took the chair.

The other office-bearers of the Association were then elected, as follows:—

Vice-Presidents, Mr. G. C. Mackenzie, J.P., and Mr. Jno Christie Watt, J.P.; Secretary and Treasurer, Mr. W. D. Stewart; Committee, same as last year; Hall Committee same as last year; Delegates to Natal Agricultural Union, Mr. Edwin Peckham, J.P., and Mr. G. C. Mackenzie, J.P.; Auditor, Mr. Jno. Christie Watt, J.P.

The meeting terminated with a vote of thanks to the Chairman.

Brining butter is the best method of salting this product, but can only be practised in small dairies, as its cost is prohibitive where large quantities of butter are made. Dry-salting is the least expensive method of salting butter, but by this method it is more difficult to thoroughly distribute the salt.

It has been proved by Grandeau and Henry, two French professors of agriculture, that, besides serving as food for earth-worms and other organisms, the activity of which keeps the soil porous, friable, and superficially rich in nutritive mineral matter, dead leaves fix atmospheric nitrogen to the extent of 12 to 20 lb. per acre annually.

Two things the writer has found should be avoided by the poultry owner. 1. Wire netting of a mesh just large enough to let a fowl push its head through. The comb and wattles will prevent its withdrawing it without difficulty and fright, and perhaps injury results. 2. Poultry houses made of thin boarding. They look nice perhaps, but give poor protection. They are stuffy and cold in winter, and stuffy and hot in summer.

Sidelights.

WHAT OUR EXCHANGES ADVISE.

* * *It has often struck us what a quantity of useful information is published every month in our various agricultural contemporaries in reply to enquiries from correspondents, and it has occurred to us that the publication in this Journal each month of the gist of the more interesting and useful of some of these "Replies to Correspondents" may prove valuable to some of our readers. We accordingly make a start in the present issue, and we shall continue so long as we have reason to believe that this new feature of the Journal is appreciated by our readers. We can only afford space for a few notes each month, but we will endeavour always to give the best "tips" that come to our notice.—ED.*

STOMACH WORMS IN LAMBS.—Feeding tobacco dust or ground tobacco stems is claimed by some breeders to be a preventive for this pest. This is mixed with salt and put where sheep have free access to it.

* * *

WHEN TO CUT WHEAT.—Cut wheat before it is fully ripe, when the head and a few inches down the stem below the head are yellowish, and when the grains are no longer milky when squeezed but are of the consistence of dough.

* * *

LICE IN CHICKENS.—To rid chickens of lice, give the bird a good dust bath over which a handful of sulphur is occasionally scattered. Also blow insect powder amongst the feathers of each bird. The powder may be a mixture of three parts powdered sulphur and one part of pyrethrum or Keating's powder.

* * *

PRESERVING SUET.—A useful method of preserving mutton suet without or with a minimum of salt is the following:—Melt the suet down, or "render" it, as it is termed; pour it into a bowl or jar, or other similar vessel, and allow it to solidify. It should keep thus very well, even without salt, for a considerable period, say a few months, if stored in a cool, dry place, but if kept in a warm, damp, "close" situation it is liable to become mouldy.

* * *

TO DESTROY ANTS.—Tomato plants in a bed on the south side of a garden underneath a grape vine were infested with ants. Dusting freely with soot had been tried, without success. Correspondent was

advised, if he could find the ants' nests, to pour some boiling water or paraffin down on them; if not, to get some honey, mix a little white arsenic in it, and put some of the mixture in little pans or saucers, with some thin bits of wood for them to climb up, near their runs.

* * *

KILN-DRIED GRAIN.—To a question as to whether there is any difference in the fattening properties of oats and barley, kiln-dried and undried, an answer has been given that as the drying merely dries off the moisture, rendering oats and barley dry and hard, there is probably no difference in the actual fattening properties, unless in cases where the grain has been malted and then kiln-dried, when the starch content of the grain becomes changed into sugar. By crushing you will render the grain more digestible; indeed, without crushing it is unwise to feed kiln-dried grain to horses, as being so dry and hard it is liable to pass through them largely undigested. Another thing to be remembered is that kiln drying is sometimes resorted to for the purpose of "sweetening" musty grain, and in this case the grain is liable to be injurious.

* * *

HEIFER WITH SNORE.—A young heifer about ten months old had a snore, with a hard lump under the jaw which seemed to be increasing in size, but she fed well and was in very good condition. The reply was: Enlargements of the glands of the throat accompanied by snoring should always be regarded as serious, as in the majority of cases they are evidences of tubercular disease, especially in adult cattle. Seeing that this animal is so young, we would advise giving her 40 grains of iodide of potassium daily for twenty days, and to paint the lump twice or thrice weekly with liniment of iodine. Diet her well, giving an allowance of crushed oats and oil cake daily.

* * *

SKIN DISEASE.—Irritation of the skin which induces horses to rub themselves is sometimes caused by parasites, when the disease is termed mange, and spreads from horse to horse, but when this is not the case it is possibly a case of eczema. There are so many skin diseases, and so many causes in operation to produce them, that it is impossible to do more than guess as to the reason of the mare rubbing herself. She should be given a dose of physic, and afterwards a powder morning and evening composed of equal parts of nitrate of potash, sulphur, and powdered gentian root. Her teeth should be examined for any irregularity there, and, if present, corrected. The food should consist of crushed oats, bran, and sweet chaff, with which a little salt and malt meal may be mixed in the midday feed.

BRINGING A YOUNG COW INTO SEASON.—The veterinary adviser of one of our contemporaries was asked whether there is any simple stimulant to bring a young cow into season, and he replied that, provided she is healthy, she will come into season every twenty-one days; and he advised correspondent not to drug her, but to turn her out for a few weeks with a vigorous young bull.

* * *

ROUP IN FOWLS.—As roup is a highly contagious disease, it is absolutely necessary that any bird which shows the symptoms should be isolated with as little delay as possible, in order to avoid the spread of the affection through the fowl run. Affected birds may be easily cured by confining them in a fairly warm dry house or room which is free from draughts, and washing the mouth, eyes, and nostrils twice a day with a solution of one part chlorinated soda to two parts of water. It is also advisable to administer half a teaspoonful of Epsom salts when the symptoms of roup are first noticed. During the period of treatment the best food to supply is barley meal mixed with skim milk and seasoned with cayenne; this should be fed warm. The treatment is the same for chickens, except that the dose of salts should be not quite so much as for full-grown birds.

* * *

FOOD SPITTING.—The habit observable in some horses of spitting out the food after chewing it up—quidding, as it is generally called—is invariably associated with dental defects or disease of the mouth, rendering mastication painful. The thing to do in such a case is to have the mouth and teeth properly examined, and defects, if possible, removed—in other terms, determine and remove the cause. Seeking a food he would not serve in this way is quite the wrong way of dealing with a case of “quidding,” because a food which the animal can easily masticate and swallow—bread, for example—would probably be unsuitable for the animal, and in the end cause digestive disturbance and inefficiency. Further, proper mastication, which means a large admixture of saliva, is essential to proper digestion. Considering the age of the animal, it is probable that the imperfect mastication, and the inability of the animal to fit the food for swallowing, is due to irregular or overgrown molar teeth—the mill stones do not properly grind the corn. This can generally be rectified by rasping, or, in bad cases, by shearing.

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

As a result of investigations conducted in the United States on the question of the removal of plant food from growing plants by rain and dew, it has been found: (1) That on ripening the salts held in the sap of the plants have a tendency to migrate from the dying to the living tissue; (2) that this migration is upward and not downward, there being, in fact, little evidence to show excretion through the roots into the soil; (3) that plants exude salts upon their surfaces, and the rain then washes these salts back to the soil; (4) that the analyses of plants for ash constituents may give misleading results when it is desired to determine the amount of plant food absorbed by or essential to plant growth, unless the leaching action of rain and dew be considered.

Value of the Experiment Station.

The broad aim of the experiment station is to provide assistance by means of discovery and acquisition. The discovery, or the thing acquired, may be of a concrete or an abstract nature. That is to say, the work that is carried on may lead to the recognition of useful principles in relation to its problems, or to the production of actual agricultural apparatus, strains of plants, etc., which will be beneficial to those whom its labours are intended to serve. As regards the methods of acquisition, the knowledge of what is being done at other stations may have advantage taken of it by the application of principles that have been formulated at these, or the acquirement from them of actual things that will be of use in the district for which its efforts are made, such as, again, valuable mechanical aids in agriculturture, and new plants. Without an experiment station, the worth of results obtained by others cannot receive proper consideration, in reference to the conditions which obtain in a particular locality, and those who are resident there have no one to advise them when attention is being given to proposals to introduce new plants, machinery, or other substantative means of assistance.—*Agricultural News* (W.I.), 6th Aug., 1910.

Weakly Ohlokens.

In a bulletin issued by the New York State College of Agriculture at Cornell, there are some interesting remarks of the vigour of fowls and and its influence on productiveness. The killing of the weak chickens is advised directly their weakness is noticed, or at any rate they should be

carefully kept out of the breeding pen. The points of a weak chicken are thus summarised:—It has “a short, round, shrunken body; dull, sunken eyes; pale, thin, flat beak; short, thin, down; pale, thin shanks; and a peevish, squeaky voice. It has a poor appetite, and lacks ‘gumption,’ as indicated by its inactivity and failure to ‘rustle’ with the stronger chicks.” In some cases the weakness will not show itself till the feathering stage. Physically weak birds can then be told by their irregular or incomplete feathering. Often they fail to develop their bodies in proportion to the wing feathers, so that the wings appear too large for the body. Such chickens should be marked so that even if they overcome their weakness they may never be used for breeding.

Training Farm for Boys.

We learn from the *Journal of Agriculture* of South Australia that the Minister of Agriculture of that State has practically completed arrangements for the establishment of a training farm for boys. It is not proposed to establish a rival establishment to Roseworthy College, but to provide means for elementary education in agriculture for boys whose parents cannot afford to send them to Roseworthy College. The object of the minister is to encourage boys who sell newspapers and do odd jobs about the city streets to take up farm work in the belief that the healthy environment of a country life will build them up physically, mentally, and morally. It is believed that 12 months' training on the proposed farm will give a boy sufficient experience to make him acceptable to farmers who need assistance on their farms. Board and lodging, clothing, and boots, as may be decided upon, will be supplied in return for the labour of the boy. A scheme of bonuses or premiums will be instituted for the purpose of encouraging boys to do well and provide them with funds when they leave the institution.

The Split of the Orange.

L. Savostano, in a bulletin issued by the Italian Government, expresses the opinion that the usual splitting of oranges is caused by an excessive absorption of water by the fruit and a consequent rupture of the skin of the orange from internal pressure. In 1908 in the Province of Sorrentino, the season was very dry and hot, and the fruit for that reason did not reach its usual size but ripened prematurely and showed much splitting. This splitting is claimed to have been produced by the long drought in most instances, but in a few cases it seemed to have originated from an abnormal capillary proliferation that thrust itself outward against the surface of its orange and finally split it.—(*Rural Californian.*)

A Sunflower Farm.

It is seldom that the sunflower is cultivated in Natal for commercial purposes. It is found growing in many gardens as a bright and attractive flower, and the seeds are often gathered and given to the poultry. The same is true of Queensland, but, we read in *Dalgety's Review*, on the Binjour Plateau, in the Wide Bay district, a settler is cultivating a considerable acreage with this showy flowering plant, which gives to his farm quite a unique appearance. He has a contract with a southern firm for all the seed he can raise, and he has systematically arranged his areas of land to keep up an almost continuous supply for the market open to him. One paddock is ready for the harvesting, but others are in various stages of development that will be ready in succession to crop. He expects that he will gain very satisfactory results from the venture. In the south of Europe the sunflower is often grown as a field crop, and the seeds sold as food for cattle and poultry, and also to manufacturers for the oil they yield. Sometimes, too, they are used in pharmacy for making demulcent and soothing emulsions, and in some places an infant's food is made of them. Among the American Indians the seeds are used in making bread. In Australia they will be mainly utilised for the valuable oil they yield, which is very little inferior to olive oil. Soap and oil cake manufacturers will always provide a ready market for this product at a payable price, and as the leaves make good food for cattle, and the flowers abound with honey, so that if bees are kept near the plantations successful apiaries can be worked, the cultivation of the sunflower should be a profitable undertaking. More than fifty bushels of seed can be raised from an acre of land, and the labour required in raising this product is not excessive. It is evident that other settlers may enter upon this industry with advantage.

Liquid Manure for Intensive Cultivation.

In *Farm, Field, and Fireside* for June 17th J.C.N. discusses the question of the utilisation of liquid manure for intensive cultivation. He points out that liquid manure is admirably adapted for this purpose, since, not only is it richer in nitrogen, phosphoric acid and potash, the three most essential requirements of plant life, but these agents are also more readily available for the nourishment of crops than when supplied in the form of dung. A proper tank for holding liquid manure may, he says, be obtained at a moderate expenditure, or, as an alternative, an excavation can be made to a depth of about 6 feet; this hole or pit can then be lined with chalk, or else bricked up roughly and coated with earth, that in turn being covered by a layer of concrete about six inches thick. The approaches to the pit should be gradually sloped in order to allow the drain-

ings from the cow sheds, piggeries, and stables, etc., to find their way therein. He adds that it is wise to dilute the manure with a small quantity of water—that is, unless rain or storm water is allowed access to the manure tank, thereby diluting it to a proper degree. In another issue of the same paper another writer discusses liquid manure and describes how it may be made. Elsewhere in the present issue of the *Journal* we reproduce the main points of his article together with the illustrations connected therewith.

Methods of Sowing Maize.

A comparison of the yields obtained by planting corn in rows, one kernel to each place, with those resulting from planting in hills is made in *Farmers' Bulletin* No. 400, of the United States Department of Agriculture, which has been issued recently. Our West Indian contemporary, *Agricultural News*, in summarising the contents of this Bulletin, states that it is pointed out in this that the advantage of the former method is that it gives each plant a fairer chance to develop normally. The latter method possesses the advantage that the corn can be cross cultivated and kept free from weeds, and the whole soil surface maintained in good condition by means of mechanical tillage.

The experiments that are described all showed that, under different conditions of climate and soil, and with different varieties of corn, better results were obtained by planting the corn in hills, the kernels being spaced 5 inches apart, than by the ordinary method of dropping them close together in each hill. This is because planting according to the latter method results in unnecessary crowding of the stems and roots, so that the plants are weakened and the yield is reduced. It is estimated that, in the United States, the use of seed planters which dropped the kernels separately, instead of all together, would add 50,000,000 bushels of corn to the annual production of that country. (We believe we are right in saying that previous experiments in the United States have shown that whatever may be the best method of sowing other kinds of maize—whether in hills or singly—for Hickory King, which is the principal variety grown in Natal, the best results are obtained by sowing the seeds singly, on account of the difference in the root system of plants of this variety as compared with those of plants of other varieties.)

Food Values.

Says a writer in *Monthly Hints on Poultry*: I wonder how many poultry-keepers have the least idea of food values. They have their own experience to go by of the rough-and-ready type, and where ordinary

fundamental principles are known and applied all goes well. But where these are not known outbreaks of disease are by no means uncommon, and the commonest of all is liver disease, which is a comprehensive term with poultry-raisers for the wasting of a fowl (though it have a voracious appetite), a blackened comb, and a stilty, too steady way of moving. Thousands of farmers' fowls die in this way annually. And the reason is to be found in the fact that they are mostly fed, morning and evening, upon Indian corn.

Of course, a weekly menu and all that kind of thing is absurd. But, at the same time, there ought to be free admixture of meals and cereals and changes rung incessantly, and a general nutritive ratio for summer of 1 to 4, and in winter of 1 to 5 ought to be maintained. And to do this some table of nutritive values ought to be kept handy. And just a wee bit of science may be necessary. Surely most poultry-keepers know that the food they give their poultry consists of protein, or flesh-forming, material, carbohydrates, or warmth-giving food, and fats. And by a 1 to 5 ratio is understood 1 part of protein to the rest. But to arrive at the rest, multiply the fat by $2\frac{1}{4}$ and add it to the carbohydrates. Suppose a food were 12 per cent. protein, 72 per cent. carbohydrates, 5 per cent. fat, rest refuse, the nutritive value would stand at 1 to 6, but for the fats. But $2\frac{1}{4}$ by 5 equals 11.35, so that we have to add about 11 and a third to 70, making the nutritive value about 1 in 7, which would be too heat giving. Such food would want mixing with other foods not so rich in carbohydrates and fat. Flesh meat must be given to fowls in some shape or another. Without flesh meat the weight is not so great; in fact, without flesh meat it takes about a quarter more vegetables than with meat to make an extra pound weight of flesh.

The Value of Agricultural Shows.

In a recent number of the *Queensland Agricultural Journal* the substance was published of an excellent paper that was read on "The Functions of Agricultural Societies" at an Agricultural Conference held at Warwick, Queensland. The author of the paper, in the course of his remarks, thus summarises his opinion as to the value of agricultural shows:—"My own opinion is that agricultural shows are of the greatest value, and at no time more so than the present. It has probably occurred to those who have given the subject unprejudiced attention, that the chief value of these competitive exhibitions is threefold—namely, first, the opportunity they give of comparison; secondly, the emulation they excite; third and last (and by no means least), their use as an advertising medium. The dairy, the shoeing, the beekeepers' and seeds-

men's stands, also the poultry demonstrations, are all of practical importance, and all gathered in so concentrated an area that it is possible at least to run through them within the limits of a day's outing, and the man would have indeed a clouded eye and an obtuse mind who was unable to gather fresh ideas, and take some, at any rate, away with him. In addition to those named are all the smaller exhibits—small, but none the less important to the agriculturist: fences, troughs, gates, pumps, and lesser tools, such as rakes, forks, spades, etc.: all these can be inspected and studied alike by the small crofter, the 1,000-acre occupier, or the large landed proprietor."

On the matter of the number of small shows which are held in country districts in Queensland as well as in South Africa the author of the paper had the following interesting remarks to offer:—"I myself have been disposed to question whether the number was not excessive, as they seem at times to overlap one another; but, doubtless, this is an ill which rights itself, for those that do not pay will disappear. Our larger shows monopolise so much time and expenditure that it is not everyone who can afford to patronise them, extending as they do from two to eight days. Now, at the little one-day local show, the small farmer can start in the morning from home, take his prize, and be back again with his animal the same evening: he is not scared here by what is termed the professional exhibitor, but can meet his like on fair grounds. It brings to the front many a small breeder, and many a good animal, who, in their turn finding their ways thither, act as feeders to the larger shows. Much responsibility, however, rests with the promoters and councils of these local shows in initiating classes and providing adequate prizes for bringing out their district breeds to the best advantage; much lies with them in encouraging the right sort of stock, suited to the requirements of the day, for no doubt we agriculturists must travel with the times. The services of the best judges should be carefully secured, well-known men of practised judgment, who can be depended upon to recognise and pick out the correct stamp. Through these means the local shows will, as I suggested above, act as feeders to the larger ones, and the whole work together in framing our national show system."

Paper from Bagasse.

In the *Tropical Agriculturist*, Mr. Raitt, chemical engineer and fibre expert, Bangalore, discusses the possibility of the manufacture of paper from megass or bagasse—the refuse crushed sugar canes and chips from the diffusion batteries in the sugar mill. Mr. Raitt does not think that the megass is likely to be of utility in the manufacture of inferior

writing paper, book printing paper, or even news paper, but he considers that it may be very profitably utilised in some localities for the manufacture of unbleached paper, and wrapping and packing paper. Cane sugar factories, he says, are usually situated in localities where all manufactured goods have to be imported at a considerable cost for freight, and, probably, import duties also. Where such circumstances exist, together with a sufficient local demand for unbleached wrapping and packing papers, or even for the thin unbleached paper so largely used by the natives of India and elsewhere for correspondence and accounts, it is quite possible to show that a paper mill may prove a very profitable auxiliary to a sugar factory, and that the bagasse may be worth considerably more for this purpose than its present fuel value.

Mr. Raitt states that a paper mill suitable for this class of paper, to produce 40 to 50 tons per week, would cost roughly, £20,000. A conservative estimate of the cost of production, under average conditions, exclusive of the fuel value of the bagasse but including repairs, depreciation and 50 per cent. interest on cost of plant, amounts to £10 10s. per ton. Under the conditions above referred to, the product should be worth £15, leaving £4 10s. as the paper-making value of the 2½ tons of bagasse required to produce it, or, say, £2 per ton. The cost of steam coal to replace it in the sugar factory furnaces would be at the outside, £1 10s. per ton. In calorific effect, a ton of good steam coal is usually assumed to be equal to 4 tons of bagasse, so that the full value of the latter cannot exceed 7s. 6d. per ton. Deducting this, there remains an estimated profit of £1 12s. 6d. per ton of bagasse converted into paper.

Variations in Cream Tests.

Variation in tests has caused much dissatisfaction in the selling of cream. When the cream is from the same cows, which have been fed the same ration and milked by the same man, and when the same separator is used, the farmer naturally thinks the per cent. of fat in the cream should remain the same. Errors are often made in making tests, especially in taking the sample, but variations constantly occur that are due to other causes. The most common causes of these variations, as pointed out in a circular No. 37, by Prof. C. H. Ekles, of the Missouri Agricultural Experiment Station, Columbia, Mo., are as follows:—(1) Variations in the speed of the separator. (2) Variation in temperature of milk separated. (3) Rate the milk flows into the machine. (4) Amount of water or skim milk used in flushing out the bowl. (5) Change in the richness of the milk separated. (6) Adjustment of the cream screw.

Change in the speed of the separator is the most common cause of variation. The greater the speed of the separator, the smaller the amount of cream and the higher the per cent. of fat. Again, the temperature of the milk separated varies on the farm from day to day. If cream tests 30 per cent. when the milk is separated at 90 degrees, it may test as high as 40 per cent. when separated at 70 degrees. Under average conditions on the farm, however, the variation in fat due to change of temperature will not amount to more than 3 or 4 per cent. A third cause of variation is found in the rate at which the milk flows into the machine. If less than the regular quantity flows into the bowl, the tendency is to increase the per cent. of fat in the cream. The richness of the milk separated affects the richness but not the quantity of cream. The richness of a cow's milk depends on inheritance and can not be changed permanently by feed. Small variations are likely to occur from the other causes suggested by Prof. Eckles. By the use of an ordinary Babcock testing machine and by measuring the sample of cream into the test bottle with the same pipette as is used for measuring milk, any farmer can make a test of his cream that will satisfy him as to the accuracy of the test he receives from the cream buyer

Cover Crops and Clean Weeding.

Mr. J. B. Carruthers, the Assistant Director of Agriculture for Trinidad has issued a pamphlet on "Cover Plants as a Substitute for Clean Weeding." We have not received a copy of the work, but we take over the following summary of it given by the *Bulletin* of the Imperial Institute, London:—The clean weeding of estates as practised in the Tropics is a legacy from experience in temperate countries, and has given excellent results, so that planters are not naturally inclined to abandon it. There are, however, certain conditions obtaining in the Tropics, which render clean weeding disadvantageous. The chief of these are as follows:—(1) Denudation by tropical rain is severe on land which is regularly weeded and consequently has its upper layers of soil in a loose and friable condition, (2) the soil thus lost is rich in plant food, and though part of it may be recovered by an efficient drainage system, the recovered portion is not re-spread and consequently is of little value to the estate as a whole, (3) clean weeded land dries and hardens in the sun so that the upper layers of the soil become inefficient for cultivation purposes, (4) the cost of clean weeding sometimes forms as much as 60 per cent. of the total cost of working an estate, and labour needed for other purposes has often to be diverted to this work.

These difficulties may be avoided by using cover plants to prevent the growth of grasses and weeds. Plants suitable for use in this way should have the following characteristics:—(1) They should shade the ground without producing an impermeable, matted surface, (2) they should remain green in drought, (3) they should be of sufficiently vigorous growth to prevent the growth of weeds, grasses, etc., (4) they should not grow more than 2 feet high so that they do not interfere with the crop. It is further an advantage that the plants should be leguminous, so that the soil in which they grow may become enriched in nitrogen by their aid. The following provisional list of suitable cover plants is suggested:—*Mimosa pudica*, *Tephrosia purpurea* or *T. candida*, *Crotalaria striata* or *C. incana*, *Abrus precatorius*, *Mucuna pruriens*, *Desmodium triflorum*, *Vigna* spp., *Passiflora foetida*, *Ipomoea batatas* (sweet potatoes).

"DON'TS" FOR POULTRY-KEEPERS.

- Don't take eggs to market unless they are clean and inviting.
- Don't forget that eggs are porous, and contaminating surroundings will spoil them.
- Don't forget that if a brooding hen is allowed to sit on a fertilised egg for twelve hours the flavour is spoiled.
- Don't forget that the sooner eggs are marketed the better.
- Don't forget that the flavour of the egg is affected by the quality of the food given to hens.
- Don't keep a male bird with hens that are not required to breed from.
- Don't allow hens to eat decayed vegetable or animal substances.
- Don't keep the water in the sun; it should be always sweet and clean.
- Don't forget that sharp grit is teeth to poultry.
- Don't feed poultry at irregular intervals.
- Don't have filthy nest-boxes; keep them linewashed, and have clean hay, straw, shavings, or pine-needles in them.
- Don't fail to have two or three nest-eggs in each nest; it goes a long way to prevent fowls eating their eggs.
- Don't have perches nailed, or built in step-ladder fashion, but have them on a level 12 in. to 18 in. from the ground.
- Don't forget to breed from your best layers only.
- Don't fail to fill your incubator and brooder lamps daily.
- Don't send to the export depots birds that are not in good condition.
- Don't fail to work up a private trade if possible.
- Don't fail to keep a record of the eggs laid during the year.—(*Agric. Gazette*, London).

Reviews.

THE SOILS OF CAPE COLONY.

A STUDY OF THE AGRICULTURAL SOILS OF THE CAPE COLONY. By Charles F. Juritz, M.A., D.Sc., F.I.C., Senior Government Analyst of Cape Colony, President of the Chemical and Agricultural Section of the S.A. Association for the Advancement of Science; Past President of the Cape Chemical Society, etc., etc. Cape Town: T. Maskew Miller. 1909. [Price, 7s. 6d.]

ONE, and certainly not amongst the least important, of the many tasks which have to be undertaken by every new country which aspires to be up-to-date in its agriculture is the systematic and scientific examination and classification of its soils. We are not, unfortunately, sufficiently well up in the geology of the world to be in a position to venture any opinion as to how the soils of South Africa compare with those of other countries, but we know that the geological system of this country is sufficiently complicated to render the task of the scientific investigator and classifier of soil no enviable matter. Prof. Juritz has made a notable start with the investigation of the agricultural soils of the oldest of the four Provinces of the South African Union, and he is to be complimented not only upon his courage in undertaking this vast work at all, but also for the conciseness with which he has presented us with the results of his investigations. As Prof. Juritz states in the prefatory note to the book before us, the investigations which have been carried on under his direction into the nature and composition, from an agricultural point of view, of the soils of the Cape Colony constitute the only work of the character ever undertaken in this country. Previous to their commencement, few isolated analyses of South African soils had been made—some by Prof. Hahn, and some by Prof. Juritz himself—but these were scanty and disconnected. Never before has any systematic investigational work of this kind recorded by Prof. Juritz in his present book been attempted. Of course, as the author states, the number of soils examined is not fully representative of the whole Province, but this is nothing to be wondered at, considering the vast extent of the country, and the fact that the investigations here recorded are the first of their kind. It is, however, a very good beginning, and it is to be hoped that the scope of them will be extended before long so as to include the other Provinces of the Union also.

Prof. Juritz has divided his work into seven parts, the first of which is introductory, and the other treats respectively of agricultural chemical methods, results of chemical analyses, comparison of soil extraction

methods, geological relations and plant food, alkalinity of soils, and physical composition of soils. Of these, Part 3, which contains the results of analyses of soils in Cape Colony, comprises by far the largest section of the book. The book is provided with a good index, and will be found of value by many outside of the Cape Province.

A BOOK ON ROSES.

ROSE CULTURE: Adapted to South African Conditions. By Hugh Manson. Maritzburg: Times Printing & Publishing Co., Ltd. 1910.

A book on rose culture suited to the requirements of this country is a long-felt want, and Mr. Hugh Manson has, in co-operation with the Times Printing & Publishing Co., endeavoured, and, we think, most successfully, to meet this want. He begins his little book with a discussion on the classes of roses most suitable for culture in South Africa, and then goes on to give some hints as to soil and planting. A considerable amount of attention is given to pruning, including the pruning of old trees—a subject to which many possessors of old gardens in Maritzburg and elsewhere would do well to give attention. Manuring receives its due meed of attention, whilst spraying, watering, disbudding, staking, shading, and other matters are included. The first part of the booklet is brought to a suitable conclusion with some useful hints on exhibition.

The second part of the book comprises a very useful “select list of 100 varieties of roses suitable for any purpose, with raiser’s name and year of introduction, also full descriptions of same, with a note on the pruning of each variety”; and the names are also given of the choicest varieties of roses most suitable for exhibition in collections of six, twelve, twenty-four, and thirty-six sorts.

We should have liked to have seen a better arrangement of the matter of the book under classified headings, but the book is a small one, and this fault in no way detracts from its value from a practical point of view. The work will be found of value by all lovers of roses.

THE WOOL INDUSTRY.

NOTES ON WOOL GROWING, SHEARING, SKIRTING, CLASSING AND PREPARING FOR MARKET, from the points of view of the Grower, Selling Broker and Manufacturer, Durban: Reid & Acutt’s Wool Mart, Ltd.

We have to welcome the issue by Messrs. Reid & Acutt’s Wool Mart, Ltd., of Durban, of a most interesting and useful pamphlet dealing with the growing of wool and its preparation for market, considered from the points of view not only of the grower himself, but also of the

selling broker and the manufacturer. We have already printed in the *Journal* the two leading articles contained in this pamphlet—one by Mr. James J. McCall, the Government Wool Expert for Natal, and the other by Mr. W. F. Earle, of Messrs. Ebell & Co., Wool Buyers, Durban—which we were able to do owing to the courtesy of the Secretary of Messrs. Reid & Acutt's Wool Mart, Ltd., in sending us advance proofs. Besides these two articles, the booklet before us contains an interesting account of the growth of the wool mart, and of the company's business methods, whilst there are a number of interesting illustrations of the company's stores and of various noted sheep, and also a picture taken during the process of sorting and grading fleeces at the Government Experiment Farm at Cedara.

For over thirty years the company has been among the leading firms of wool brokers in Natal, and during that time they have persistently urged upon growers the necessity of improved methods. Their advice now takes definite and lasting form in the shape of the pamphlet which they have issued, in which to the results of their own long experience in the South African wool trade as selling brokers they have added the advice of the best available local authorities. Mr. McCall has dealt with all points in connection with the growing, shearing, skirting, classing, and packing of wool, and Mr. W. F. Earle has well represented the views of the wool manufacturer and his buying agent. The pamphlet is issued in English and Dutch, and we recommend all wool-growers to obtain a copy of the book, a study of which will be well worth the time and trouble bestowed upon it.

THE COLLECTION OF BIRDSKINS, ETC.

ALCETTES AND BIRDSKINS: The Truth about their Collection and Export. By Harold Hamel Smith, Editor of *Tropical Life*. With a Foreword by Sir J. D. Rees, K.C.I.E., C.V.O., M.P. London: *Tropical Life* Publishing Department, John Bale, Sons & Danielsson, Ltd., Oxford House, 83-91, Great Titchfield Street, Oxford Street, W. 1910. [Price, 5s.]

For some years past, enthusiastic and well-meaning, but badly-informed, agitators have been urging the British and other Governments to discourage, if not altogether to prohibit, the wearing of birdskins, feathers, or plumes in hats or about the person, unless such plumage or feathers have been obtained from birds whose flesh is used for food, the grounds for such opposition to the trade being, in the first place, because it is alleged it is cruel to kill birds, and, secondly, because the birds are becoming exterminated. Mr. Hamel Smith, the Editor of *Tropical Life*, has prepared a defence of the collection of feathers, skins, etc., in

which he shows that, judged by the standard that prevails in England (the most humane and considerate country with regard to animals and birds), the methods employed in the collection of birdskins and feathers in the tropics are not cruel. As Mr. Hamel Smith says, no fair-minded person can deny that it is less cruel or repugnant to the feelings to shoot birds for a necessary object (*i.e.*, to earn a living) than for a wholly unnecessary one, as the killing of game for wanton sport. "If the English are not cruel in permitting game-shooting, particularly as the birds are specially reared for the purpose of being killed, neither are the natives of India and the tropics when they shoot the birds to earn a living." Furthermore, taking the world as a whole, Mr. Hamel Smith does not consider that the birds are in danger of extermination or of becoming rare. Should, however, it be found otherwise with certain species, his suggestion on page 21 of his book to appoint a permanent International Committee, chosen to represent all sides of the question, to look into the matter is worthy of attention.

OTHER BOOKS RECEIVED.

THE CATTLE OF SOUTHERN INDIA. By Lieut.-Col. W. D. Gunn, Superintendent, Indian Civil Veterinary Department, Madras. Madras: Department of Agriculture. [Price Rs. 2 = 5s.]

THE HERD-BOOK OF LINCOLNSHIRE CURLY-COATED PIGS. Vol. IV., 1910. BIRTHS, Nos. 899 to 1,257. SOWS, Nos. 3,264 to 4,244. Sleaford: J. Sowards, General Printer and Stationer, The Northgate Press. 1910. [Price, 5s.]

THE BRITISH YEAR BOOK OF AGRICULTURE AND AGRICULTURAL WHO'S WHO, 1909-10. London: Vinton & Company, Ltd., 8, Bream's Buildings, Chancery Lane, E.C., 1909.

This is the second year of publication of the Year-Book, and the present volume is well up to the high standard set by its predecessor. The scheme of the work is indicated by the titles of the eleven parts into which the book is divided, namely:—I., Societies and Institutions, containing much useful information, not previously gathered together, with regard to the national and general societies (including Government Departments), their status and functions, character of annual shows, lists of official judges, etc.; II., County Agricultural Information, giving similar information with regard to county and local societies, the local provision for agricultural education, and other details; III., Agricultural, Horticultural, and Veterinary Education and Research, which includes chapters on the institutions of the United Kingdom carrying on the great work of agricultural instruction, with complete particulars of their work, staffs etc.; IV., Diseases of Animals and the Diseases of Animals Acts, which will be found to deal with everything that the farmer and the local and Imperial administrator can desire to know on this impor-

tant subject; V., Importation and Exportation of Animals, which will be of great assistance to breeders, agents, and others all over the world, by reason of the information which it gives as to British, foreign, and Colonial laws on the subject; VI., Agricultural Publications, providing a fund of useful knowledge to agriculturists as well as to students of agriculture and of agricultural affairs in all countries; VII., Markets, Sales, and Prices, a section which will be of service to all who wish to inform themselves on the important subject of the purchase and sale of agricultural produce; VIII., Statistical, Legal, and General Information, containing a vast amount of information on the general topics of agriculture; IX., Agriculture in the Colonies, giving interesting accounts of the agricultural conditions of some of the principal Colonies; X., List of Shows, 1909-10; and XI., Agricultural Who's Who, which consists of a unique record of about 2,500 persons connected with agriculture in Great Britain.

THE SMUTS OF AUSTRALIA: Their Structure, Life History, Treatment and Classification. By D. McAlpine, Government Vegetable Pathologist, Department of Agriculture, Victoria. Melbourne: J. Kemp, Government Printer. 1910.

This volume on the Smuts of Australia follows the same lines as that previously issued on the Rusts of Australia, to which they are only second in importance from the amount of loss caused by them, chiefly in the cereals and grasses. Like the rusts, they are all parasitic; and from the plant pathologist's point of view, there is no question, as Mr. McAlpine remarks in his Preface, that these two great divisions of parasitic fungi occupy a leading position on account of the damage produced by them in cultivated crops. The diseases caused by smuts are among the most destructive, since they often destroy the grain itself, which is the chief object of cultivation. From a utilitarian point of view alone, they are worthy of the most exhaustive research, in order to define them accurately so as ultimately to prevent their ruinous effects, and Mr. McAlpine has laid the agriculturists of his country, and elsewhere, under a great debt to him for the painstaking way in which he has conducted his investigations into this important branch of pests affecting farm crops. The work is well and profusely illustrated, and three indices—a host index, a fungus index, and a general index—add considerably to its value.

CATALOGUE OF RURAL BOOKS.—We have received from Mr. T. Maskew Miller, of Capetown and Pretoria, a copy of a catalogue of rural

books published by the Orange Judd Company, of New York, for which company Mr. Miller is the South African agent. The catalogue is a great improvement upon the ordinary type of book catalogue, in that it does not merely give the titles, authors, and prices of the books to which it refers, but it also gives a brief description of the scope of each book mentioned, so that anyone on the look-out for books on a given subject can tell pretty well which particular works among those listed will best meet his particular requirements. This catalogue describes over 500 books, and we recommend readers interested to write to Mr. Miller for a copy.

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

Of all the animals with which a Divine Providence has stored the world for the use of man, none is to be found more useful or more valuable than the sheep.—*Encyclopaedia Londonensis*.

The figures below give the average number of days required to incubate the eggs of the following birds:—Hen, 21 days; duck, 28; goose, 30 or more; turkey, 28; pheasant, 21; partridge, 24; peafowl, 28; swan, 58; ostrich, 42.—J. H. SUTCLIFFE (*"Artificial Incubation and its Laws"*).

STUDY LOCAL CONDITIONS.

Any settler in a new region may save himself many costly errors by a preliminary study of local agricultural practices. It is often true that local practice is not the best, and the newcomer may himself in time be instrumental in improving it, but it is the part of wisdom to approach the reformation cautiously.—CARL S. SCOFIELD, *Agriculturist in Charge of Western Agricultural Extension, U.S. Bureau of Plant Industry*.

THINNING FRUIT.

The thinning of fruit for the purpose of improving that which remains is a practice which is always advised, but comparatively seldom followed. It has been demonstrated time and again that no work in connection with a fruit plantation pays better than thinning. It not only results in a much finer product, but it is also a means of destroying

the insect-infested and diseased specimens, and of saving the energies and vitality of the tree.—L. H. BAILEY (*"The Principles of Fruit-Growing"*).

SOIL MULCHES.

In devising ways and means of checking the excessive evaporation losses from irrigated orchards and fields it has been found that the deep furrows and the dry, granular mulch are the cheapest and best preventatives. The deeper the mulch the less the evaporation, but there are practical considerations which limit the depth of soil mulches. A depth of less than nine inches and more than three inches would meet the requirements of the arid region in general.—SAMUEL FORTIER, *Chief of Irrigation Investigations, U.S. Office of Experiment Stations.*

FEEDING TURKEYS.

Here is my mixture for the birds' breakfast:—One part by measure of maize meal, two parts wheat screenings, one part chopped onions (or two parts mashed boiled potatoes, or two parts raw chopped sweet apples), and one part meat scraps, mixed with boiling water to the consistency of thick dough. Let it stand, covered, until the meal is thoroughly swelled. Fifteen minutes is long enough. Feed what they can eat up clean. Don't let them surfeit themselves. Then throw a little grain broadcast over the litter on the floor, and let them scratch for it. Keep clean water in clean vessels before them all the while, also pounded crockery. Feed chopped rowen or clover occasionally. Keep crushed or granulated oyster shells before them always.—HERBERT MYRICK (*"Turkeys and How to Grow Them"*).

WATER SUPPLY FOR CITRUS FRUITS.

It is useless to attempt the culture of citrus fruits where an adequate supply of water cannot be secured, either naturally or artificially, by irrigation. If the trees do not receive a sufficient amount of water, the results will not be satisfactory. When an inadequate quantity only is available, the trees do not make a normal growth, the leaves curl and drop, the young fruit falls off and such as is brought to maturity is deficient in juice and inferior in quality. Under such conditions the trees become fit subjects for the attacks of fungous parasites and scale insects. The combination of unthriftiness due to the lack of water and the inroads of different enemies soon brings about the death of the trees or the abandonment of the grove by the owner.—H. HAROLD HUME (*"Citrus Fruits and their Culture"*).

IRRIGATING ORCHARDS.

Our experience leads us to prefer a head of water just sufficient to send a moderate stream gradually along the rows. This enables the moisture to penetrate the soil more thoroughly than a rapid current would do. If practicable, water should be run on both sides of the row. This is especially desirable in the case of forest or other trees on land that receives little or no cultivation. On most grounds water is usually run along several rows at the same time. Now and then soil is found that will admit of rapid irrigation, or, as it is sometimes called, sending the water along with a rush. But this is the exception. Of course, where water is scarce and one is limited to a certain time in its use, the best that can be done is to use it as circumstances will permit. When the water has run its course turn it off. Do not let it soak and flood the ground.—LUTE WILCOX (*"Irrigation Farming"*).

A NEW LEGUME.

Guar (*Cyamopsis tetragonoloba*) is an East Indian legume, the seed of which was first obtained by the Department of Agriculture in 1903. It is very different in appearance from any other legume grown in this country. From an agricultural standpoint it is especially promising on account of its great drought resistance and prolific seed yield. With sufficient moisture it grows to a height of 5 or 6 feet, but under arid conditions only 3 to 4 feet. It is the most drought-resistant annual legume yet obtained. At Chico, Cal., a fine crop was produced without irrigation and without a drop of rain from the time it was planted until nearly mature. During the whole season it showed no suffering from drought, which seriously affected adjoining plots of Kafir corn and sorghum. In Texas it has also demonstrated its high drought resistance.—C. V. PIPER, *Agrostologist in Charge of Forage Crop Investigations, U.S. Bureau of Plant Industry*.

TREATMENT OF BOARS.

The boar of eight months or older will do better if kept by himself; at least, he should not be where sows or gilts may arouse him. He should be kept in a comfortable pen, with a lot of pasture adjoining, and supplied with a variety of nutritious food, which means something more than dry corn with an occasional drink of diluted dishwater. The permanent quarters should be provided with a view to furnish sunlight, exercise, dry warmth, and cleanliness. These should be so located that the cows may be conveniently brought to him for service. A large pen is not needed—ten feet square will do, but a yard and pasture should each be adjacent. The yard will be needed for service and for his exercise in the breeding season, and the pasture—which may be acre or less—should afford him water, shade, and grass, or other succulent food.—F. D. COBURN (*Swine in America*).

Figures for Farmers.

USEFUL FACTS, TABLES, AND FORMULÆ.

*** Under the above heading we intend publishing from time to time various figures, calculations, formulæ, tables, etc., likely to be useful to farmers at some time or other during the course of their operations. We can necessarily only publish a little each time, but we would advise farmers to cut these pages out and keep them for future reference; or, for the benefit of those who wish to keep their journals intact we may mention that each of these tables, etc., will be indexed separately, both monthly and half-yearly, and so will be easily found when required.*

BOILING POINTS.—Water, 212 deg. Fahr.; milk, 212 deg.; ether, 96 deg.; alcohol, 176 deg.; oil of turpentine, 316 deg.; sulphuric acid, 620 deg.; mercury, 662 deg.

TO FIND THE CONTENT OF A ROUND SILO.

Find the area of the base, and multiply this by the height of the silo. To find the area of the base, square the radius and multiply by 3.146. Then multiply by the height of the silo.

Example: A circular silo is 12 ft. in diameter and 15 ft. high. The radius is 6 ft. $6^2 = 6 \times 6 = 36$; $36 \times 3.146 = 113.256$, which multiplied by the height, 15 ft. = 1,698.840 cubic feet—volume of silo.—(*Queensland Agricultural Journal*.)

SHEEP NETTING.

Description.		Without Centre Strand		With Centre Strand.	
Mesh.	Gauge.	3 feet.	4 feet.	3 feet.	4 feet.
inch		lbs.	lbs.	lbs.	lbs.
3	16	50	64	54	68
	15	66	86	71	91
	14	81	102	86	107
4	17	33	40	37	44
	16	41	49	45	53
	15	52	64	57	69
	14	65	78	70	83
	13	81	...	87	...
	12	97	...	103	...

TEMPERATURES FOR THE TREATMENT OF MILK.

Milk is taken from the cow at a temperature of 95 to 98 deg. Fahr.

Milk is separated at 88 deg. to 90 deg.

Cream is churned in summer at 56 deg. to 58 deg.

Cream is churned in winter at 60 deg. to 62 deg.

Rennet is added to milk for cheese-making at 85 deg.

Scalding for Cheddar cheese, 100 deg.

Pressing curd, 75 deg.

Ordinary scalding of milk, 160 deg.

"Pasteurising" of milk, 184 deg.

Sterilising of milk, 212 deg.

(*"Practical Guide to Dairying,"* by W. Smith).

TO FIND THE NUMBER OF PLANTS PER ACRE.

The plants being set out at given distances in feet, all that is needed to find how many plants go to the acre is to divide 43,560 (the number of square feet in an acre) by the distance between the plants in the row, multiplied by the distance between the rows. For instance, plants are set in rows 4 ft. apart and the plants are 2 ft. apart in the rows: 4 times 2 equals 8; therefore, each plant has a space of 8 square feet. Divide 43,560 by 8, and you have 5,445 plants per acre. If trees are planted 30 ft. apart each way, each tree has a space of 900 square feet, which, divided into 43,560, gives about 48 trees to the acre.—(*Queensland Agr. Journal.*)

TABLE.

To turn Cwts. and Qrs. into Lbs.

cwts.	lbs.	With 1 qr. added	With 2 qrs. added	With 3 qrs. added
1	112	140	168	196
2	224	252	280	308
3	336	364	392	420
4	448	476	504	532
5	560	588	616	644
6	672	700	728	756
7	784	812	840	868
8	896	924	952	980
9	1008	1036	1064	1092
10	1120	1148	1176	1204
11	1232	1260	1288	1316
12	1344	1372	1400	1428
13	1456	1484	1512	1540
14	1568	1596	1624	1652
15	1680	1708	1736	1764
16	1792	1820	1848	1876
17	1904	1932	1960	1988
18	2016	2044	2072	2100
19	2128	2156	2184	2212
20	2240	2268	2296	2324

TABLE OF EQUIVALENT HYDRAULIC UNITS.

One imperial gallon	=	277'274 cubic inches
" "	=	'16 cubic foot
" "	=	10'00 lbs.
" "	=	4'537 litres
One cubic inch of water	=	'03607 lb.
" "	=	'003607 imperial gallon
One cubic foot of water	=	6'23 imperial gallons
" "	=	28'375 litres
" "	=	'0283 cubic metre
" "	=	62'35 lbs.
" "	=	'557 cwt.
" "	=	'028 ton
One lb. of water	=	27'72 cubic inches
" "	=	'10 imperial gallon
" "	=	'4537 kilo
One cwt. of water	=	11'2 imperial gallons
" "	=	1'8 cubic feet
One ton of water	=	35'9 cubic feet
" "	=	224 imperial gallons
" "	=	1000 litres (approximately)
" "	=	1 cubic metre (approximately)
One litre of water	=	'22 imperial gallon
" "	=	61 cubic inches
" "	=	'0353 cubic foot
One cubic metre of water	=	220 imperial gallons
" "	=	1'308 cubic yards
" "	=	61028 cubic inches
" "	=	35'31 cubic feet
" "	=	1000 kilos.
" "	=	1 ton (approximately)
" "	=	1000 litres
One kilo. of water	=	2'204 lbs.
One atmosphere	=	1'054 kilos. per sq. inch
A column of water 1 ft. high	=	Pressure of '434 lb. per sq. inch
A pressure of 1 lb. per sq. in.	=	Column of water 2'31 ft. high

TO MEASURE A HAY STACK.

Find the distance from the ground on one side up over the stack to the ground on the other side. Then measure the width of the stack at the base, add these two numbers and divide by four and this will give one side of a square representing the same area as the end of the stack. Multiply this number by itself and this result by the length of the whole stack, and this will give the cubic feet represented by the stack, which, divided by 512, the number of cubic feet in a ton, gives the number of tons. Where the stack is very high and settled, or where it is well packed in a shed, divide in the last instance by a number between 350 and 425.

Pure air is free and inexpensive, and will enter every nook and corner of the poultry-house if it is permitted. It is one of the very essential things to the profitable raising of poultry. Close, stuffy quarters are very injurious.

The Position of East Coast Fever.

OUTBREAKS DURING JULY-SEPTEMBER.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 20th July to 20th September:—

Dundee Division.—Outbreaks on the farms "White Bank" (adjoining "Iennox"), "Flint" (east of main line), "Heilbron," "Uitzegt," "Langlaagte," "Struisvogelspruit," "Junction," "Palmietfontein."

Umhazi Division.—Outbreak on the farm "Hill Crest" (portion of "Langefontein").

Alexandra Division.—Outbreaks on the farms "Lot 2, Hlokozi," "Jolivet No. 3," "Forest Reserve" (adjoining "Sea View"), "Woodlands," "Sunnyside," "Location 2," "Sea View."

Klip River Division.—Outbreaks on the farms "Kleinfontein," "Milichau" (adjoining "Riverside," "Ngulu," "Hamburg," "Doornhoek," and "Matawan's Kloof"), "Blauw Bank" (shown on map as "Blue Bank"), west of line.

Richmond Division.—Outbreaks on the farms "The Hill" (sub-division of "Kruisfontein"), "Beechwood," "Diepe Kloof," "Indaleni Mission," "Arnold's Hill," "Green Hill," "New Windsor," "Craigside" (sub-division of "Paarde Kraal"), "Buckworth" (sub-division of "Strathfeldly"), "Hill Prospect" (sub-division of "Nottingham"), "Dunbar Estate" (consisting of Lots in Township of Byrne).

Izopo Division.—Outbreaks on the farms "Wolsley," "Lots 4 and 7, Lufafa," "S. 38 and Batmans," "Lot 6, Mahlabatini," "Lot 24, Dronk Vlei," "Rem. S. 62, Lea Fia," "S. 73," "B.Q.," "Wesley," "Peaumont," "Faxon," "Rem. S. 41," "Claybrooke" (marked on map as "Rockcliffe").

Estcourt Division.—Outbreaks on the farms "The Poplars," "Strydpoort," "Labuschagne's Kraal," "Moord Spruit," "Cypherfontein," "Snelster," "Snowflake."

Lower Umzimkulu Division.—Outbreaks among Mr. Zeeran's cattle at Port Shepstone, and on farms "Wheatlands," "Montana," "Gosen," "Levanger."

Alfred Division.—Outbreak on the farm Bisset Fynn's Land No. 8."

Polela Division.—Outbreaks on the farms "Buckquay" (S. 95 and 96), "Half-my-right."

Camperdown Division.—Outbreaks on the farms "Lynton," "Mountain View" (sub-division of "Vaalkop").

Umvoti Division.—Outbreaks on the farms “Avondale” (portion of “Roodekrans”), “Wyards” (portion of “Roodekrans”), “Sophiadale,” “Val Vak Vlake,” “Gilboa” (Stuirton) (sub-division of “Vakte Hoek”).

New Hanover Division.—Outbreaks on the farms “Muirton,” (sub-division of “Uitmontend,” “Kort Kranskloof” (sub-division of “Kortkranskloof”).

Impendhle Division.—Outbreaks on the farms “The Rest,” “Crowle.”

Newcastle Division.—Outbreak on the farm “Boshoff Poort.”

Correspondence.

TO THE EDITOR OF THE “AGRICULTURAL JOURNAL.”

SIR,—Can you supply me with further information about this machine?

It appears to me that it would be a most valuable machine for the O.F.S. west and portions of Cape Colony for filling in washouts. On most farms where these washouts occur there is abundance of stone. It would solve the problem of cleaning the land and stopping the annual erosions by storm waters.

Having an interest in an O.F.S. farm where such an implement, if as good as stated, would be worth almost its weight in gold, is my excuse for troubling you.—Yours faithfully,

R. PARKIN

P.O. Box 6,

Lower Umkomaas.

[We have written to Australia asking for further information regarding the machine in question.—E.D.]

When you whitewash the interior of the poultry-house, mix a liberal amount of some good disinfectant or crude carbolic acid with the whitewash just before applying it. This will insure the destruction of all mites with which it comes in contact.

When fowls produce deformed or soft-shelled eggs they should have all stimulating food withheld from them for a time. Hard grain should take the place of soft food, and some Epsom salts, about a teaspoonful to every pint of water, until a cure is effected.

THE FARMER BOYS' PAGES.

Conducted by "ARATOR."

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS



AND NATURE STUDY NOTES

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Nature Notes for October.

Buds on the orange trees, hundreds of snow-white buds, hesitating to open fearful of what the weather may be! One day brings a hot wind, the next a thunderstorm; one day a heat-haze, the next a rain-mist veils the hill-tops and lies like a white mantel on the valleys. Hundreds of white flowers fill the air with delicious fragrance—the strong scent of the orange blossom. It is a “beauty-feast,” the orange-tree bride in spotless veil of white, her bridesmaids the naartje trees, the shaddock and lemon lingering awhile the last of the wedding guests to go.

Each successive rain brings the summer nearer. The silver oaks flower, and the blue jackeranda tree. The mango bloom is over, much of it scattered by the wind and lost. The leaves fall singly from the lequats; like a garment they drop from the orange trees, too, giving place to new spring foliage of fairest green.

In the world beyond the pineapples, the butterflies are out. In the bush the schotia tree has opened, and the birds and the bees are happy, in its deep red blossoms brimful of honey. There are hornets abroad and hairy caterpillars, strange moths and curious yellow spiders.

Down by the river the monkeys chatter noisily or steal unobserved among the bananas, through the tall grass glides a bright green mamba, roused by the warmth of the sunshine from its winter's rest. Thousands of tadpoles hang on the sand at the water's edge. If all become frogs there will be no lack of concerts in the summer-time.—M. R.

Spring Studies.

SEEDLINGS.

Before the rain came the ground was as hard as concrete, parched and dry after the winter's drought: now it is soft and spongy under foot. Within the soil, before the rain came, lay many prisoners, hopeless of release so long as that iron-bound prison wall stretched above them. But now the rain has come. Sinking into every crack and crevice, breaking up the soil completely, it has carried down to these little captives the news that they are free. And soon from out the dark damp ground hundreds of green shoots will shoot up gladly into the light.

The careful parent plant, before it allowed each seed to drop into the ground, provided it with a store of provisions. This store the little seed has still. But the food is solid, and of no use until the rain comes. The seed is about to start life as a new plant; in fact, it is a baby plant,

and, like a little human baby, it must have liquid food. How does the rain help the little seed to obtain its food? You know that if you put a piece of sugar in a little water it will disappear, and we say it has dissolved. So the rain goes to the storehouse of the seed, and by dissolving and by other ways it makes out of this store food, and the very best food, too, for the little baby plant. Mealie meal is made from the food store of the maize seedlings, baby beans feed on the part we eat.

Let us take some particular seed, say an Avocado pear seed, and see what we can find out about it. We remove the husk and find the ripe seed splitting in two. This is not the baby plant itself, but the store of food it has received from the parent tree. Now let us place it in a hyacinth glass or tumbler of clean water (flat end down) and watch it



grow. What happens? The moisture soaks into the seed and wakes up the little life within. The seed begins to grow. The first month it sends down a small root with smaller rootlets, the next month it sends up a tiny stem that grows taller and taller, and greener and greener, until when about a foot high it puts out a cluster of beautiful leaves.

The root is the first part then to issue from the burst seed-coat. If in the ground, it winds spirally down among the particles of soil seeking darkness and moisture; the little stem presses upward blindly and unerringly towards light and air.

The most sensitive part of the root is its tip; it pushes its way through the openings in the soil and seeks out the places that are moist. The little stem usually protects itself by bending its head until clear of the soil, when it straightens itself up and stands erect.

1. The rain softens the ground and makes it possible for the little seedlings to reach the light.

2. It soaks through the husk and wakes up the little plant.

3. It moistens the food supply and makes it available for food.

Let us germinate a few seeds, say of mustard, on damp blotting paper, or plant a few peas and beans in moist sawdust or soil, and watch them grow. Usually the first indication of germination is the appearance above the ground of a pair of green leaves, different from the ordinary leaves of the plant. These first leaves are the seed-leaves, or cotyledons. In the pea, acorn, and some other seeds the cotyledons remain in the ground where they decay; in others, cress and cabbage, for instance, they rise out of the soil and form the plant's first leaves.

In the garden we must plant flower seeds of as many different kinds as possible. During the spring these little seedlings will require a good deal of attention. If we wish them to grow well and strong we must not forget to water them carefully and shade them from the heat of the sun. We must watch over them until the time comes, when they are old enough, to be safely transplanted.

Experiments prove that roots always bore their way downwards towards moisture and darkness, and stems push their way upward, seeking the light. Place some seeds of white mustard, say that are just starting to grow, on a piece of white muslin over a jar filled with water, cover up with a bell-jar, and place in the dark, and you will find that the young roots will grow straight down, the young stems up. Now allow the light to fall in one direction only, through a narrow opening, and in a few hours you will see that the young stems have turned towards the light, the young roots away from it.

Plant some seeds in a sieve filled with damp sawdust, the roots will grow downwards as usual, but after they reach the air they will turn and grow up again.

You know how house plants always look to the window. I wonder if you know how quick seedlings are to turn to the light? If you keep them in a dark place and only show them a light for two or three minutes about every three-quarters of an hour, you will see them bend and bow towards where you held the light.

Notes and Notions.

"The world is so full of a number of things."

We found a very tiny mantis yesterday, and the question was asked will it grow into a big one or it is a different variety? A butterfly does not grow after it comes out of its chrysalis, why should a mantis?

It will grow into big one. A mantis differs from a butterfly in that it does not pass through a caterpillar or grub stage. They belong to the grasshopper and cricket family. The larvæ when hatched from the eggs are not unlike the mature insect except that they are smaller and do not possess wings. Wings are formed gradually and there is no resting or pupal stage. These insects feed in all their stages, being active and voracious throughout their lives. Thus they differ from butterflies and beetles whose pupæ are inactive and do not feed. Some are very destructive. The "voetgangers," or baby locusts, are almost as destructive as the winged locusts.—"SCOTTSVILLE."

THE JACKY HANGMAN.

The only text-book of Nature-Study is the Book of Nature always open before our eyes and of which Time all too quickly turns the pages. Bird-life is one of the most fascinating chapters, and because it is difficult is no reason why it should be left so severely alone. We all know the Johnny Hangman and the harshness of his note, but had some difference of opinion with regard to the colour of his coat. We are indebted to the Rev. N. Abraham for the following note:—

"An adult male is always conspicuously black and white. The female is not quite so decided. The young birds are very dull coloured, and the birds the boys saw must have been young birds before they got their full plumage. There is, however, a Shrike or J. Hangman that has a brown back and there is another whose back is a bright crimson or red, like the colour on a "blood-finch," but this bird is found higher north. There are a number of species. I once saw a large species of Hangman that was so much like a dove in size and appearance that it was difficult to distinguish it on the wing."

Notes from Our Juniors.

The Jacky is a very cruel bird. Once I saw a Jacky sitting on a barbed wire fence. Three birds flew by; all of a sudden the Jacky caught the young one. He then came back to the fence. The father and mother saw their little baby killed, so I took it and threw it out of their sight.

The Jacky has black and white feathers; it is found nearly everywhere in Natal.—KEITH ARBUTHNOT (8 years).

The Jackie Haugman is a black and white bird; it has a long bill, which is very sharp. It is a clever bird and uses other birds' cries and habits.

One day when I was out in the country I saw a Jackie pretending to be hurt, when a pretty little bird came to see what was the matter. The Jackie seized the bird, killed it, and hung it on a thorn-tree. Once when I was climbing a tree, I saw a Jackie's nest with a big piece of lace in it. Another day I saw a Jackie's larder, with a fret, five white eyes, and a fink all hanging in it.—A. PRENDERGAST (*10 years*), Merchiston.

VELD FLOWERS.

The first spring posy from the veld—tiny flowerettes beautiful in themselves and still more beautiful in that they hold the promise of the year.

What are they? A crocus (*Apodolirion Buchananii*) in time to smile at the snow on the Berg; there will be hundreds in a day or two when the cold has gone. A solitary blue iris shivering on its stem, a single fire-lily, a little scarlet flame, heralds both of the great lily pageant we hope to see. Five little white flowers (*Wurmbea Knossii*) lilies in miniature, forerunners of the thousands lingering to come with the grass. A tiny cluster of deep blue flowers and darker buds (*Clerodendron hirsutum*) sweet rounded buds and curled up stamens. I can see it growing close to the ground whole beds of blue. Six little *hypocys*, golden as buttercups, first to appear of the myriads of stars that ere long will be gazing at the sky. And one brave little ram's horn (*Aponogeton Natalense*) that has come up through the cold, dark mud to tell us the bog will be white with them soon.—“HILTON ROAD.”

SPRING IN NATAL.

Poets have sung melodiously from time immemorial of the delights of spring, but I do not think any of them could have passed any length of time in South Africa. I should like to know how can “a young man's fancy lightly turn to thoughts of love” when the gales are blowing his very eyelashes off, when the dust grits between his teeth, and the hot winds spoil his temper and make him use naughty language. As for the maidens, alas poor maidens, they are busy putting cold cream on their complexions, and trying to combine a cool skirt with one heavy enough to keep down.

Oh no! Spring is all very well in a nice, retired country spot in England, with apple blossoms and things, but here in South Africa the sooner we get it over the better.—“HILLCREST.”

DAY AND NIGHT.

From grey of dusk the veils unfold
To pearl and amethyst and gold—
Thus is the new day woven and spun.

From glory of blue to rainbow spray,
From sunset-gold to violet grey—
Thus is the restful night re-won.

F.M.

THE JOYS OF GARDENING.

There is the beauty of form and colour—the result of your own labours. There is the joy of growth, the unfolding and perfecting day after day. There is the triumph of overcoming difficulties. There is the certainty that Spring will follow Winter, that in her generosity Nature will wipe off your mistakes and give more opportunities whatever the past has been.

Sweetest and most lasting joy of all perhaps is that acquaintance and contact with Nature in her different seasons and moods, which is the heritage of the gardener. Who can describe in words the exquisite joy of the summer morning when you wander out at sunrise to be with your garden, the new life of that magic moment, which, till the dew is off the grass, is neither yesterday nor to-day but a Paradise of glitter and song that lies between? Or who can paint the peace of the hour when the dusk is slowly creeping on after the long, hot day, and you linger fondly among the sweet scents of your flowers, watering here, picking off a dead petal there, doing only such small and gentle offices as shall not disturb the twilight slumbers of the garden?—"RUSARI."

Dry feeding is especially profitable for chicks during the summer, as wet or moist mashies, if not quickly eaten up, will sour and brood troubles will result.

Gapes is best cured and prevented by careful use of air-slaked lime. A slight dusting in coops occasionally will act as a certain preventive. For chickens affected put a few ounces in the bottom of a box, place the chickens on it, cover with sacking, and shake up well. If repeated two or three times every two hours the worse cases will be cured. There is no need to use turpentine and feather.—*Poultry World*.

The Principles of Manuring.

VII.—FARMYARD MANURE (*Continued*).

HAVING noted the nature and value of farmyard manure for fertilising purposes, we may now proceed to consider the practical application of this form of manure. On most farms where farmyard manure is made use of will be found a manure heap of which the manure is kept both for the purpose of rotting it and for accumulation until it is required or until there is sufficient for a field. Let us first consider what happens in this manure heap, for an understanding of the more or less obscure changes which take place during the process of fermentation, decomposition, or putrefaction, will enable us better to understand how to conserve our manure in the most economical way. In order to understand the matter properly we must realise that decomposition of organic matter of any kind is effected by organisms of various kinds; and these organisms can be divided into two large classes. In one of these classes the organisms require a plentiful supply of air in order to enable them to develop, and if air is excluded from them they will die. The second class consists of organisms which do not require air—in fact if they have oxygen they will die. The organisms coming under the former of these two classes are known as aerobics, and those belonging to the latter class—that is to say those which cannot live in air—are called anaerobics. These terms should be remembered as they are commonly found in discussions on farmyard manure. (It will be noticed that the two words are the same with the exception that the word applied to organisms *not* requiring air has the prefix “an.”) Now these two classes of organisms are to be found in the manure heap, and it is they that produce the decomposition of the manure. Considering a heap on to which the fresh manure has been thrown and left there without any attempt at directing the nature of the decomposition, in the centre of the heap where there is little or no air, the anaerobic organisms will be most active in doing their work, whilst away from the centre, where there is more air to be found, the aerobic organisms will preponderate. If that heap be left alone, as decay progresses the aerobic organisms will gradually increase in number and the anaerobic will gradually disappear. The anaerobic organisms break up the complex organic substances in the manure into new and simpler forms, and when they have done this they die and give place to the aerobic, which finally convert the organic matter into water, carbonic acid gas, and other simple substances. What we want, in conserving the manure heap, is to bring about the breaking up of the more complex organic compounds which the manure contains into relatively simple forms which can be made use of by crops.

Evidently, then, the friends of the farmer are the organisms belonging to the anaerobic class; and we have consequently to take such steps as will exclude as far as possible the aerobic and provide conditions which will enable the anaerobic to continue unfettered in their work. To do this we should cover the manure heap with a thin layer, 5 or 6 inches thick, of earth; and to assist further in keeping out the air from the heap, and also because the higher the temperature the more rapidly will the manure decay, we should throw water over the heap from time to time. In this way we shall enable the manure to ferment but slowly, and the result will be nicely rotted manure that has lost little of its fertilising virtues.

The value of rotten manure, says Prof. Aikman, is, weight for weight, greater than that of fresh manure. This is due to the fact that, while the water increases in amount, the loss of organic matter of a non-nitrogenous nature more than counterbalances the increase in water. The manure, therefore, becomes more concentrated in quality. Prof. Aikman adds that the manure does not become richer in manurial ingredients, but the forms in which these ingredients are present in rotten manure are more valuable, since they are more soluble.

There are three ways in which farmyard manure may be applied to the field. It may either be set out in heaps and allowed to remain thus some time before being spread, or it may be spread broadcast over the field and allowed to lie in this condition for some time, or finally it may be spread out and ploughed in at once; and the last is perhaps the safest and most economical method. As regards the rate of application per acre, in Stephens' "Book of the Farm" the quantities advised are, 8 to 12 tons per acre for roots, and from 15 to 20 tons together with artificial fertiliser for potatoes. For general dressings German authorities recommend from 12 to 18 tons to the acre. It must be remembered, however, that the effects of farmyard manure are by no means confined to the first season, lasting, as they do, over several years.

(To be continued.)

The loss in weight of an ordinary fowl by bleeding and plucking amounts to about 12½ per cent. of the live weight.

Worms in fowls, though they do not often cause death, tend to produce exhaustion and to reduce the supply of eggs. *Farm Life* gives the following treatment for them:—Give 10 to 15 drops of turpentine in a tablespoonful of sweet oil, night and morning, for three days. Another remedy is 1-12 oz. powdered areca nut, given every third morning before feeding, followed by a tablespoonful of sweet oil two hours afterwards.



(1) Members of a Boy's Maize Club at Tyler, Texas.—A Real School of Agriculture.



(2) These fine mealies were grown by the boy seen standing in the centre of the picture.

HOW TO MAKE A FARMER.

Photographs reproduced from Year Book of the United States Dept. of Agriculture, 1909.

Fruit Culture.

FRUIT CULTURE.

SOME CHATS FOR BEGINNERS.—VI.*

By "POMUS."

IN these articles I do not propose to make any pretence of covering all branches of fruit culture, however sketchily; they pretend to be nothing more than "chats" for beginners on some of the more important branches of the subject. In a series of preliminary articles, and especially in short articles such as the present, it is hardly necessary to endeavour to give anything like a complete exposition of the science; and what is necessary, I think, is, by touching on the more important branches of the subject, to introduce the novice in the practical way to fruit culture, so that he may become fitted to follow intelligently text books on the subject or articles on branches of it which appear from time to time in other parts of the *Agricultural Journal*. In pursuance of this plan we will pass over the subjects of the situation of orchards, manures and soils (which can be discussed later in separate articles), and consider next the subject of transplanting.

In speaking of the transplanting of fruit trees we refer to seedlings more particularly—seedlings which are probably being used at stocks on which to graft or bud better kinds of fruits. The seed is planted in the nursery, and when the young trees have developed sufficiently they are taken up and planted out in the orchard or wherever they are to remain.

In considering this subject of transplanting the important point which we have to note is the set-back to the tree occasioned by the practically inevitable mutilation of the roots when the young trees are dug up and how best to minimise the danger to the tree occasioned by this mutilation of the roots and by the change of conditions consequent on the re-establishment of the tree in new surroundings.

To begin with, it should be realised that as a general rule the roots of the tree are spread out all round the tree to the same distance as the height of the tree itself, so that if a tree is four feet high the circle of roots will be 8 feet in diameter. Realising this, it is easy to understand that it is practically impossible to prevent the destruction of a

* Owing to an oversight I omitted last month to state that the illustrations of the processes in connection with budding and grafting, on page 387 of the *Journal* were taken from "The American Fruit Culturist."

portion of the roots when a young tree is transplanted, and furthermore, why in transplanting in the ordinary way, trees are so often set back in their growth. A little thought will show that if you remove a portion of the roots of the tree you thereby cut off to a corresponding extent part of the usual supplies of sap to the leaves above, and as a result not only does the tree suffer for the want of sap but also the leaves themselves throw off more moisture than the tree is able to replace by means of the roots. It would therefore not be surprising if a tree which had a large percentage of its roots removed in the course of transplanting were to wither and die without ever having the chance of recovering, but, as I have said, we cannot help destroying a certain proportion of the roots, and consequently we must take some steps to restore the balance which under ordinary conditions is maintained between leaves and roots. To do this we must remove a percentage of the leaves of the transplanted tree corresponding to the proportion of roots removed, by pruning back some of the branches.

First of all the roots themselves, after the tree has been dug out, should be carefully gone over and all the bruised portions cut off clean so as to prevent decay and assist them in healing over. Then we must prune back the top of the tree itself. How far this should be done depends upon the climate; in a moist atmosphere the leaves throw out less moisture and consequently less leaves need to be removed than in the case of a dry atmosphere where the leaves will perspire more freely. As a guide the shortening back should be to the extent of one quarter of the length of each shoot of the previous year's growth, and if, owing to the dryness of the climate, it is thought necessary to shorten back considerably, the shoots should be cut down to one strong bud just above the previous year's wood. Do not cut off large branches at random, as this will spoil the shape of the tree. In the matter of the degree of shortening back regard must also to some extent be had to the kind of tree concerned. For instance, trees which reproduce new shoots quickly (as, for instance, the peach), can be shortened back more than those which do not throw out new shoots as freely—an example of which is the apple.

So much for the pruning of the tree. Having prepared the roots in the manner described, a bed of mud should be prepared, and the whole of the roots should be dipped into the mud, so as to keep them from contact from the air. The next matter is the setting of the tree. The first rule to remember is not to set the tree deeper than it stood before it was removed in the nursery—unless, of course, there is a possibility of the ground settling away from the tree as a result of its having been newly ploughed. If the soil has been dug too deep make a mound in the centre

of the hole so as to raise the tree. Let the hole be wide, so that the roots may be well spread out and not cramped together. Then take some fine, rich mould and carefully fill in all the interstices between the roots—this should be done with the hand by preference. Fill in the rest of the earth and raise it 2 or 3 inches above the ordinary surface of ground in order to allow for settling. If there is danger of damage by high winds a stake should be driven into the bottom of the hole alongside the stem of the tree before the roots are covered; lincn or straw bands should be used for tying the tree to the stake.

(To be continued.)

PRICKLY PEAR AS A FODDER PLANT.—The despised prickly pear has been proved by some South Australian dairymen in the far north to be an excellent fodder for milking cows. In the absence of other green food some of the varieties of prickly pear did good service, but a certain proportion of dry feed was supplied at the same time, as the pear by itself was too laxative. Some of the varieties grown were almost thornless, but the most satisfactory kind was that with large round leaves and well-spiked. The spikes, it must be understood, have to be well scorched before the cattle touch the pear. One grower strongly recommends the article, as, once established in the very dry country, he estimates five acres would amply supply nearly 50 head of cattle, and keep them in milk for at least three months. For country that cannot be irrigated this should prove useful in serving the needs of dairy cows, as the prickly pear is an extremely hardy plant.—(*Dalgety's Review.*)

SOME "DON'TS" FOR CATTLE BREEDERS.

DON'T mistreat your cattle by not feeding and watering them properly, and then expect them to give good results.

DON'T expect your cattle to be good to you unless you are good to them.

DON'T ever kick a calf. It might kick back, then your feelings would be hurt.

DON'T think your cattle have reached perfection, but strive to make them better.

DON'T sell a mean bull to your neighbour for breeding purposes. If you do, his calves are liable to be mean, in which case it will be a bad advertisement for your breeding.

Some Orders of Insects.

By CLAUDE FULLER.*

IN studying entomology, the very first thing one has to learn is what an insect is, because the term is so frequently applied to animals that are not insects, and not even related to insects. If you glance at the screen you will see a portrayal of a lobster or crayfish. Now one never thinks of calling a lobster, a crab, or a prawn an insect, and yet they are much closer relatives than a number of small creatures which get the name. Insects, in short, belong to a group of animals which have outer skeletons and jointed legs. Anyone who has eaten a lobster, a crab, or a prawn, knows that the outside skeleton has to be removed before the soft, muscular body is arrived at, and also that the meat is to be found inside the jointed tubular legs. One has only to carry the well-known structure of a lobster in mind to sufficiently realise the principle upon which the bodies of insects and their near relatives are built. In point of fact, these "insects of the sea" are very like to the insects of the land, and I would draw your attention to the points of resemblance between a lobster and a true insect, and the differences. As in one, so in the other, we find three regions—the head, the thorax, and the abdomen. In insects, we find one pair of antennæ, but in the lobster two pairs are present. Insects have six legs: lobsters always more. The feature that distinguishes lobsters and the like from all other jointed limbed animals is that they breathe by true gills.

SPIDERS, SCORPIONS, AND MITES.

Closely related to the insects are the spiders, scorpions, and mites. In one form or another you are well acquainted with the members of this class. The peculiarity of their structure lies in the cementing together of the head and thorax so that the body is made up of two great regions instead of three; further, they never possess antennæ, and always have eight legs.

A familiar illustration of this class of animals is the daddy long-legs, who, despite the extreme length of his legs, never lifts his body up any more than is absolutely necessary when he walks. In America, these peculiar spiders, which are perfectly harmless, and feed upon small insects, are called "harvestmen." Children catching them say: "Grandfather Greybeard, tell me where the cows are, or I will kill you." As the poor creature points its legs in all directions, it usually earns its freedom, but too often not without the loss of one or more legs.

* Adapted from a lecture delivered under the auspices of the Durban Horticultural Society, September, 1910. The illustrations referred to (which were thrown on to a screen with a lantern) are not reproduced here.

Spiders are all predaceous, feeding mostly on insects, and our next picture shows a jumping spider feeding upon a caterpillar. Later, in discussing the true insects, cases of what is known as protective mimicry will be illustrated, where insects resemble animate and inanimate objects, so as to escape from their natural enemies. In the picture now before us, we, at first sight, see only a cluster of golden yellow flowers; with more attention, however, you will notice two yellow spiders, whose colour closely approximates that of the flowers, so that they may, with more success, lie in wait for unwary insects which might otherwise be frightened off by the sight of them. This peculiar imitation of colours for aggressive purposes can be noticed almost any day and in any garden, the search of a bed of white flowers seldom failing to reveal the presence of several white spiders nestled amongst them.

SOME NOTORIOUS PESTS.

Closely related to the spiders are the mites, the small mites such as red spider, sheep scab, and the cheese mites, and the great mites, or ticks. Among this group we have some very notorious pests, and recent researches have shown that, in South Africa especially, ticks are responsible for the transmission of many serious animal diseases. The illustration at present before us shows the small blue tick—the engorged female stage—notorious as the transmitter of ordinary Redwater. Ticks have life cycles very similar to those of insects, and our next illustration shows the metamorphoses of this common blue tick. The female is seen laying eggs, from which emerges the young six-legged larvæ, which subsequently become nymphs, and later develop into males or females, in which stage, as may be judged by the figures, a marked difference exists between the sexes. A remarkable feature exhibited by the blue ticks is that having once reached a host they go through all their transformations upon it, whereas other ticks, such as the bont, or tortoiseshell, next shown in its various stages, leave the host twice, once to change from larvæ to nymph, and next to change from nymph to adult.

CENTIPEDES AND MILLIPEDES.

The next division or class of animals nearly related to insects comprises the centipedes and millipedes. These creatures have tubular bodies made up of a series of nearly equal-sized segments or rings, to which are attached, in the case of centipedes, one pair of legs, and in the case of millipedes, two pairs—hence the popular names of “hundred legs” and “thousand legs.” Many species of centipedes are poisonous, but the pictures used to illustrate this class represent a beneficial creature, the house centipede. This delicate, long-limbed centipede is greatly feared, and as often as not destroyed, whereas it is not only quite harmless, but a great enemy to silver fish, moth, and even bed bugs. The thousand legs

or millepedes are most familiar creatures, and our picture shows the large common form frequently met with. This is quite harmless in every way, but some of the smaller kinds destroy potatoes and other root crops.

We now come to the insects themselves, and I think it will be more instructive and convenient if we review these in the more important of the natural orders into which the class is divided. Upon the structure of insects I have already made some reference, and, apart from the fact that some take their food in a liquid form by suction, and others bite and chew, it is really only necessary to point out upon this occasion how they breathe. The diagram before us shows the breathing system of an aphid, and it will serve as an example for all insects. The interior of an insect's body contains a network of filamentary tubes which connect up with a number of main tubes which end in small orifices in the body wall. These orifices are along each side of the body, and, as a general rule, there are two in each segment. The air enters these openings, and travels along the tubes. There is no regular inhalation or exhalation in the sense that we respire. The importance of a knowledge of how insects breathe lies in the fact that it is only by suffocating them in one way or another that a number of injurious kinds can be satisfactorily dealt with.

APTERA.

The first order of insects is that known as aptera, because its members are all without wings. Of course, there are many wingless insects in the other orders, but they are abnormal, and are wingless because either the wings have never been necessary, or they have disappeared through non-use. The true aptera are illustrated by the familiar silver fish and spring-tails. Not only are the aptera the simplest insects in their structure and development, undergoing none of the remarkable changes which most other insects do, but they are the most ancient forms, and are the present-day representatives of the ancestors of all insects.

EPHEMERIDA.

The delicate little May flies, creatures of a few hours' delight, form the second order of insects. They drop their eggs—myriads of them, in a little parcel—into the water, where the early stages are passed. The larvæ, or young, of which a drawing is given, are remarkable for the gill plates along each side of the body. Most remarkable of all, however, is the transformation into the adult stage. Although the adult insect may only live for a few hours, in its early stages it lives for one or several years, and then changes to a nymph. From this nymph there issues out of the water an apparently perfect May-fly, which, after flying a little while, alights and sheds its skin again, the skin coming from all parts of the body, including the wings. This feature is not met with in the case of other insects, and it would be impossible to assign any reason for it.

ODONATA.

The members of the next order are the familiar insects known as dragon flies, characterised by long, narrow, finely-netted and powerful wings. There are two groups of dragon flies, the heavier-bodied which, when at rest, extend the wings horizontally, and the lighter-bodied—sometimes called “July” flies—which fold the wings over the body. A curious feature about dragon flies, which you may perhaps have noticed, is that they cannot walk. This is because the legs are set in a basket-like arrangement, to aid them in holding and eating their prey when in flight. Their eggs are dropped into the water, and the young which hatch therefrom are veritable dragons of the deep, ugly-visaged creatures, praying upon all sorts of small aquatic animals. The comical appearance of the face is due to the fact that the remarkable lower lip with which they catch their prey is folded over it in the form of a mask. Despite the many superstitions with which these insects are surrounded, they are quite harmless.

ISOPTERA.

The next natural order with which we have to deal contains only one family, the termites—better known and notorious for the damage which they do throughout the warmer parts of the world as white ants. They are, of course, not true ants, nor are they all related, but they have certain social habits similar to those of ants, and some external resemblance to them in shape. Every white ant colony is divided into several classes. First, there are the workers, constituted of undeveloped males and females, whose business it is to build the nests, collect and carry food for the community, and bring up the young. Then there are the great-headed soldiers, also more or less developed creatures of both sexes, who are supposed to guard the colony, and certainly the big jaws with which they are provided look very business-like. Last, we have the royal class of kings and queens, better called the fathers and mothers. After rains, these royal couples, if mature, leave the nests in great swarms, and fly about in the air. Falling to the ground, they dispense with their wings and pair off, each male selecting a female whom he follows blindly, until, as a general rule, disaster overtakes the couple. However, but two or three couples in every thousand survive the vicissitudes of the wedding flight, and these form the new nests and colonies, becoming the future king and mother-queen of the colony. It is generally accepted that of themselves these mates cannot found a colony, but require a staff of workers and soldiers drawn from an established community to help in the self-appointed task. I have every reason to believe, however, that they can do so, rearing their first-born themselves. Thus the new nest starts in a very small way, but as soon as the numbers of young have increased

sufficiently, they take up the duties and look after their parents. Relieved of further responsibilities, and ensconced in a palace all to themselves, the queen and king keep one another company, fed by their attendant young. Soon eggs begin to develop much more rapidly, and the queen swells enormously, in some tropical species the abdomen swelling to six or seven inches in length. As soon as the eggs are laid, they are carried off by the workers, and the young subsequently placed upon the fungus beds to feed. These fungus gardens are found in the nests of most of our Natal termites.

FORFICULIDA.

The next order is constituted of a single family also, the earwigs. These creatures are supposed to creep into the ears of sleepers, but there is absolutely no record of such a thing ever occurring. It is much more likely that they got their popular name from being found in the ears of grain.

(To be continued.)

Sheep Notes.

A WET fleece is not comfortable, even in hot weather.

Good lambs are never reared unless they receive a favourable start in life.

Mutton sheep give the best returns when fed for that purpose when young.

A sheep must produce a variety of products if it is to be most profitable.

In order to realise the most for wool there must be a uniformity of condition.

Everything that decreases the cost of production is so much self-help for the wool grower.

The profit of wool growing depends as much on the cost of production as the selling price.

By docking and castrating lambs when the animals are from eight to ten days old they receive practically no set-backs.

There are no animals on the farm that are more particular in regard to the quality of their food than sheep.

If the sheep becomes costive, oil meal will remedy.

Any ewe that has weak, watery eyes is either in poor health or lacks constitution.

Horse Notes.

THE stallion's head should be clean, sharply chiselled and square, his eyes full of bright, soft fire, and his head gracefully set on.

The compactness of his frame and body is of great importance. His legs and feet should be of great quality, for his foals will inherit much of the qualities of the extremities from him.

Every breeder will admit that beyond all question of doubt both the stallion and the mare have each direct and distinct influence over their offspring in regard to size, quality, shape, courage, health and soundness.

If the mare's and the stallion's predecessors have produced good colts and fillies they are all the more valuable for breeding purposes.

When selecting a well-bred mare, observe that the hair of the mane and tail is fine and perfectly straight. Waving or coarse hair denotes bad blood.

Pointers from the Pen.

DISEASE often comes as a result of overcrowding.

No class of farm stock can utilise screenings so well as poultry.

Early hatched pullets, if kept growing all summer, will commence laying reasonably early in winter.

With poultry, as with other stock, food may be wasted by feeding too much as well as by feeding too little.

Always use a pure-bred male in the flock, no matter of what breed it may be, and the chicks will be uniform.

Don't overcrowd your birds in the warm weather, or you may have catarrh or gapes amongst your poultry.

** * Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.O. Editor, "Natal Agricultural Journal," Maritzburg.*

All correspondence on matters connected with irrigation in the Province of Natal should be addressed to the Acting Secretary for Lands, Department of Lands, Pretoria.

Meteorological Returns.

Meteorological Observations taken at the Govt. Stations for the Month of August, 1910.

STATIONS	TEMPERATURE (Fahr. Deg.)				RAINFALL (In Inches)						
	Means for Month		Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day.		Total for Year from July 1 1910	Total for same period from July 1 1909	
	Maximum	Minimum					Fall	Day			
Observatory ..	72.3	55.9	94	47	1.04	3	.53	31st	1.43	1.92	
Stanger ..	75.5	52.6	98	45	.14	1	.14	1st	.14	2.01	
Verulam ..	78.8	51.5	96	44	.61	6	.45	30th	.78	1.76	
Umbogintwini ..	73.7	50.8	95	43	1.35	4	.74	31st	2.06	2.13	
Winkie Spruit ..	72.0	52.9	94	47	1.30	4	.63	30th	1.38	1.83	
Port Shepstone ..	71.5	52.7	80	45	1.27	5	.50	1 & 17	2.67	1.20	
Imbizana ..	74.2	51.1	93	44	1.1	4	.50	2nd	2.03	1.17	
Umtinto ..	73.2	47.6	78	37	1.33	3	.18	18 & 26	1.96	1.39	
Mid-Illovo ..	71.7	53.6	91	39	1.18	7	.51	2nd	1.85	1.22	
Bulwer ..	63.6	39.2	81	24	.88	9	.34	19th	.95	—	
Richmond ..	70.2	44.7	89	33	2.36	5	1.00	1st	2.89	.99	
Krantzkloof ..	71.3	54.9	88	46	1.23	7	.31	2nd	1.28	1.23	
Maritzburg ..	72.8	45.1	90	33	1.83	5	.90	30th	1.89	.90	
Cedara ..	61.9	36.3	87	24	1.33	12	.20	2nd	1.39	—	
Howick ..	69.7	40.7	86	28	1.13	4	.76	30th	1.66	.76	
New Hanover ..	76.0	44.6	92	32	1.21	6	.45	1st	1.41	1.08	
Krantzkop ..	73.9	48.7	79	42	.39	3	.28	1st	.39	1.52	
Greytown ..	72.1	48.7	88	32	1.15	6	.83	31st	1.50	1.45	
Lidgerton ..	72.0	32.7	87	20	1.50	7	.55	30th	1.61	.71	
Nottingham Road ..	68.0	32.0	85	18	.56	4	.27	1st	1.36	.69	
Estcourt ..	74.1	40.5	86	30	—	—	—	—	—	.97	
Weenen ..	81.9	38.4	93	28	.06	1	.06	30th	.06	1.45	
Lady Smith ..	78.3	42.6	89	29	.28	6	.15	31st	.28	1.77	
Dundee ..	73.6	45.6	84	35	—	—	—	—	—	2.69	
Newcastle ..	80.5	28.7	87	21	—	—	—	—	—	1.65	
Charlestown ..	70.9	37.1	84	23	.00	1	.00	13th	.00	1.51	
Utrecht ..	83.6	25.1	93	18	—	—	—	—	—	2.06	
Vryheid ..	74.9	48.0	86	33	.13	5	.10	2nd	.13	2.21	
Faultiersburg ..	77.4	44.9	89	30	.00	2	.00	2 & 28	.24	—	
Ngomi Forest ..	67.6	47.0	83	37	.84	16	.22	1st	.97	2.57	
Umbobo ..	71.1	52.2	79	41	—	—	—	—	1.10	1.95	
Nongoma ..	73.3	47.2	91	37	.20	3	.10	19th	.37	1.90	
Hlabisa ..	73.2	49.1	90	45	.36	2	.30	26th	.49	1.13	
Mahlabatini ..	77.8	40.2	93	34	.14	2	.07	25 & 30	.64	1.45	
Empangeni ..	76.2	52.9	100	44	1.84	4	.67	31st	2.15	4.22	
Mtunzini ..	81.4	50.0	97	40	3.88	7	1.00	17th	5.18	6.66	

Meteorological Observations taken at Private Stations for the Month of August, 1910.

STATIONS	TEMPERATURE (In Fahr. Degs.)		RAINFALL (In Inches)						
	Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day		Total for Year from July 1, 1910	Total for same period from July 1, 1909	
					Fall	Day			
Maritzburg, Botanical Gardens ..	92	31	1.82	4	.18	30th	1.93	.85	
Ottawa ..	—	—	.99	5	.42	31st	1.31	—	
Mount Edgecombe ..	—	—	.97	5	.44	31st	1.28	—	
Cornubia ..	—	—	1.11	—	—	—	1.29	—	
Milkwood Kraal ..	—	—	.52	—	—	—	.67	—	
Blackburn ..	—	—	.73	—	—	—	1.00	—	
Saccharine ..	—	—	1.02	—	—	—	1.29	—	
Umtinto, Beneva ..	—	—	1.38	3	.48	30th	1.88	—	
Riet Vlei ..	—	—	.40	3	.24	31st	.90	1.01	
Cedara—Hill Station ..	85	30	1.56	7	.86	31st	1.55	—	
Cedara—Vlei Station ..	87	24	1.32	11	.83	31st	1.32	—	
Winkel Spruit ..	94	47	1.30	4	.63	30th	1.38	.33	
Weenen ..	89.5	34	.10	1	.10	31st	24.71	1.33	
Giant's Castle ..	67.38	41.16	.58	4	.26	18th	.73	1.09	
Umhlangeni ..	—	—	1.56	4	.50	17th	1.72	1.98	

Coal and Labour Return.

Return of Coal Raised and Labour Employed at the Natal Collieries for the month of August, 1910:—

COLLIERY	Average Labour Employed					Output Tons Cwt.
	Productive Work			Un-productive Work	Total	
	Above Ground	Below Ground	Total			
Natal Navigation ..	370	723	1,093	6	1,099	29,183 19
Durban Navigation ..	236	719	955	13	968	22,658 —
Elands-laagte ..	311	752	1,063	30	1,093	19,809 5
Glencoe (Natal) ..	158	549	707	21	731	18,124 4
St. George's ..	255	499	751	7	761	16,416 —
Natal Cambrian ..	179	511	693	32	725	14,424 7
Dundee ..	212	419	661	—	661	13,074 5
South African ..	166	429	595	20	615	10,897 2
Hlobane ..	142	349	491	48	539	10,730 13
Burnside ..	181	321	502	133	635	10,057 17
Hatting Spruit ..	99	340	439	7	446	8,727 15
Ramsay ..	82	182	264	6	270	7,084 8
Newcastle ..	74	317	391	13	401	6,863 11
Natal Steam ..	83	214	297	—	297	6,186 3
Talana ..	77	161	241	—	241	4,921 4
Ballengeich ..	77	93	170	21	191	2,445 7
West Lenoxtion ..	56	83	139	5	141	1,860 13
Dewar's Anthracite ..	15	11	29	—	29	240 —
Mooli Klip† ..	—	14	11	—	14	128 2
Vryheid† ..	6	6	12	—	12	25 —
Vaalbank? ..	—	4	1	1	8	8 —
Totals ..	2,809	6,705	9,514	69	9,883	203,854 15
Corresponding Month, '09	2,065	5,116	8,021	52	8,373	152,187 3

		Productive Work			Un-productive Work	Total, Aug., 1910	Total, Aug., 1909
		Above Ground	Below Ground	Total			
Europeans ..	..	234	210	444	50	491	423
Natives ..	..	980	4,393	5,373	219	5,592	4,495
Indians ..	..	1,695	2,102	3,697	100	3,797	3,545

* Cost charged to Capital Account.

† Includes July return.

‡ July return.

Mines Department, Pietermaritzburg,
7th September, 1910.CHAS. J. GRAY,
Commissioner of Mines.**RETURN OF COAL BUNKERED AND EXPORTED.**

Return of Coal Bunkered and Exported from the Port of Durban for the month of August, 1910:—

					Tons.	Cwt.
Bunker Coal ..	..	..	..	..	96,028	17
Coal Exported ..	..	..	..	..	21,937	4
Total ..	..	..	..	..	117,966	1

Customs House, Port Natal.
7th September, 1910.GEO. MAYSTON,
Collector of Customs, Natal.

Pound Notices.

NOTIFICATION is contained in the *Provincial Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :—

ON THE 5TH OCTOBER.

Hatting Spruit (Dundee)—(1) Brown donkey mare ; (2) Two mouse coloured donkey mares ; (3) Two mouse coloured donkey yearlings ; (4) Brown coloured donkey yearling. No visible brands, and low condition. (5) Four merino sheep, ewes, left ear slit, piece punched out tip of right ear, no brands, in low condition.

Inhlazaty (Vryheid)—(1) Merino ewe sheep, 4 tooth, no brands, top of both ears winkel haak ; (2) Merino ewe sheep, lamb of above, no brands, top of both ears winkel haak, about five months old.

Muden (Weenen)—Donkey, female, colour grey, black mark down each shoulder, mark of trace on right side, no brands or marks.

Soferino (Gourton)—(1) Merino sheep, branded C.D. on left side, V shape slit in left ear ; (2) Merino sheep, branded HSOI on back, V shape slit in right ear. These two animals are impounded, but still running in Nalans Location, Tabamhlope.

ON THE 19TH OCTOBER.

Donnybrook (Polela)—(1) Two white ewe goats. Impounded by G. Walton, Greenvale, Ixopo. (2) White sow. Impounded by J. Simpson, Creighton.

NOTICE.

The Gaoler, Umsinga, has been appointed as Poundkeeper at Pomeroy, Division of Helpmakaar, with effect from the date of assuming duty, *vice* J. van der Westhuysen, resigned.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

CHAS. J. GRAY,
Commissioner of Mines.

Return of Farms at Present under Licence for Lung-sickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Craw ..	Ladysmith ..	Scab	Natives ..	Roosboom
		"	H. Nicholson ..	Rooipoort
		"	Natives ..	Ne herton
		"	" ..	D iefontein
		"	B. J. Neima' er ..	Elandslaagte
		"	D. A. Henry ..	Tylden
A. P. Craw and ..	Ladysmith ..	"	P. Grant ..	Envogel Vlei
Murdoch ..		"	H. W. Nel ..	'own Land
		"	H. Fritchley ..	Livest Home
		"	Nat ves ..	Avonford
		"	" ..	Davel's Hoek
		"	" ..	Fourie's Kraal
		"	" ..	Mattwana' Kop.
		"	" ..	Gevonden
		"	W. M. J. Buys ..	Ruit Kuil
		"	T. Allison ..	Jacob's L dder
		"	N. Meyer ..	Klipport
		"	C. Coventry ..	Fraupt n
		"	G. I. Perry ..	Glaston Bag
A. B. Koe ..	Portion of Estcourt	"	J. Bruscott ..	Elands Spruit
		"	C. Hattling ..	Doornkop
		"	G. Spearman ..	Woodlands
		"	P. van der Merwe ..	Vaalbank
		"	W. Preto lu ..	Mount Alice
		"	Natives ..	ama
A. C. Williams ..	Utrecht ..	"	" ..	Sparklspruit
		"	" ..	Goedehoop
		"	O. J. Meyer ..	Spitzkop
		"	D. M. M. Plaff ..	We terseden
		"	Natives ..	Gumtree Gr ve
		"	" ..	"
		"	" ..	Goede Hoop
I. T. Trenor ..	Alfred ..	Lung-sickness	J. T. Clothier ..	Whitecliff
		"	R. Fynn ..	Hughende
		"	Natives ..	Location No. 2
		"	" ..	No. 6
		Scab	" ..	Mt. Helio
		"	" ..	"
R. Wingfield Stratford ..	Newcastle ..	"	Natives ..	Location No. 2
and Havemann ..		"	W. Osborn ..	Roo point
		"	G. M. rais ..	Kon ngsberg
		"	Unknown ..	Ncr mandien Pound
		"	C. G. H. Laas ..	Redcliffe
		"	Natives ..	No mandien
		"	H. J. Hearn ..	Blackmore
		"	J. V. Wade ..	Macclesfield
		"	D. N. van Rooyen ..	Les Kop
		"	Natives ..	Jubilee
		"	E. Saunders ..	Horse hoe
		"	O. Plutz ..	Gu derland
		"	R. S. Miller ..	Colagh
		"	A. Tourle ..	Majuba North
		"	A. Vanderpl nk ..	Eaglescliff
		"	F. Meyer ..	Shepherd's Bush
		"	A. J. van Wyk ..	Genton
		"	M. Collyer ..	Tatham's Camp
		"	A. M. van Niekerk ..	Spitzkop No. 5
		"	J. A. C. Morris ..	Erin
		"	M. C. Adendorff ..	Kendal
		"	C. J. de Vill era ..	Waterford
		"	F. Meyer ..	L'o Kop
		"	C. Hodson ..	Garden Villa
		"	B. J. Whiggs ..	Leicester
		"	F. J. Oosthuysen ..	River Bank
		"	A. M. Cronje ..	Vlatslaagte
		"	Dr. A. J. Abraham ..	Surrey
		"	H. J. & W. Yuteman ..	Fountain Dale
		"	A. J. Uys ..	Blaanbosch
		"	" ..	O e Tree
		"	" ..	F'u tain Da'e

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
G. Daniel	Vryheid	Scab	Natives	Trado
			D. Swart	Aloehoom
			W. Landman	Richhoek
			Natives	Toada
			F. Symmons	Hartebeestbult
			Natives	Berlin
			C. Van Rooyen	Nooitgegren
			Native	"
			J. H. Gunter	"
			Nel Bros.	Velgenoe
			Natives	Dubbelrecht
			J. Radford	"
			L. Kanya	Welgegen
			Natives	"
			D. De Bruin	R. oedepoort
			Natives	Meizelfon ein
			J. H. Erland	Gondrij
			T. W. Dukes	Grootgewacht
			R. O. van Rooyen	Brakslout
			Native	Welgelegen
			H. Haring	Prosperity
			L. Bezuidenhout	Nooitverricht
			Native	Dubbelrecht
			"	Overshot
J. R. Cooper	Nkandla & Ngutu		B. J. Hunnan	Eengene ontn
			Natives	Telee Hill
			Petrus Mate	Itela Hill
			Natives	"
			"	Insuzi
			"	Sandwana
			"	Siyongo
			H. Fry	Empandhle
			Natives	Ngutu Town Lands
			"	Macelo
			"	lood River
			"	Nkomjane
			"	Selu shana
			"	Magabeni
			"	Ngutu Fort
			"	Nondweni
			"	Blood River
			"	atshi
			"	Telee Hill
			"	Ngutu Town Lands
E. Varty	Western Umvoti		F. R. Nel	Vermak's Kraal
			G. A. Charlewood	Caldieburn
			J. P. S. van Rooyen	Thomview
R. Mayne	Eastern Umvoti & Krantzkop		Natives	Rigina
			"	Ematimatolo
			"	Veltevred n
			"	Groenkop
			"	Ungelegan
A. H. Ball	Weenen		P. P. van Rooyen	Doornkloof
			L. J. van Rooyen	Bellevue
			T. J. van Rooyen	"
			Native	Zypherfontein
			W. W. Harding	Milletu n
			M. Lotter	Wate fall
			P. H. van Rooyen	Buffalo Hoek
R. J. Marshall	Dundee		A. Jansen	Sheepridge
			L. Badenhorst	Klipfontein
			A. J. G. Meyer	Doornkop
			Native	Ontbenend
			"	Moy
			"	Damain
			"	Waterfall
			Unknown	Dundee Pound
J. F. van Rensburg	Ngotshe		P. J. C. Liversage	Toversarsue
			P. J. Swart	Rietfontein
			M. J. Herbert	Klipgig
			C. J. van Rooyen	Berveld
			Natives	Rietfontein
			"	Klip Rivier
			"	Sma del

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
E. W. Larkan ..	Umsinga ..	Scab	Nati e ..	Gordon M. moria
		"	" ..	Jobskop
		"	" ..	Vermaak's Kraal
K. Ripley ..	Emtonjweni ..	"	" ..	Kwamagwaza
		"	" ..	Koningsberg
C. E. Walker ..	Portion of Estcourt	"	Wm. McFie ..	Highlands
		"	" ..	Lowlands
		"	S. F. Boshoff ..	N ekerksfontein
		"	S. B. .. o. Blatt ..	Stanger's Hoek
		"	H. J. K. Miller ..	Beacon Hill
		"	S. C. Mara's ..	Molan Spruit
A. Hair ..	City and Umgeni ..	"	Native ..	Bishopstowe
		"	Govt. Bact. ..	Golf Links
		"	Natives ..	Zwaartkop Location
J. Radford (acting)	Pan'pietersburg ..	"	H. Rohrs ..	A tona
E. W. Bowles ..	Evop ..	"	C. J. Webb ..	Rocky Glen
		"	W. Whitelaw ..	Glenmaize
		"	Natives ..	McKenzie
J. W. Stewart ..	Bergville ..	"	E. Zanzkel ..	Leadline
		"	Mueder & sons ..	Zuur Plaats
		"	D. D. Newton ..	Rodebult
E. J. B. Hosking ..	Richmond ..	"	A. Wright ..	Hamilton
H. van Rooyen ..	Babunango ..	"	Natives ..	Onvergenoge

Division of Agriculture Notices.

FEEES FOR AGRICULTURAL ANALYSIS.

It is hereby notified that Farmers and others can secure analytical determinations from the Government Laboratory, Central Experimental Farm, Cedara, in accordance with the following scale of fees, which is subject to revision :—

	Scale I.	Scale II.
MINERALS TESTED FOR PHOSPHATE :	£ s. d.	£ s. d.
Qualitative	0 7 6	0 5 0
Quantitative	0 10 6	0 7 6
Complete	1 1 0	0 15 0
FERTILISERS AND FEEDING STUFFS :		
Determination of 1 constituent	0 7 6	0 5 0
Determination of 2 or 3 constituents	0 15 0	0 10 0
Complete analysis	1 1 0	0 15 0
SOILS: Partial analysis of a soil in relation to its fertility	1 1 0	0 10 6
Complete analysis of a soil	2 2 0	1 1 0
Complete analysis of a soil, with mechanical analysis	3 3 0	2 2 0
WATER: Irrigation and drainage	1 10 0	0 10 6
VEGETABLE PRODUCE: Fodder, Ensilage, Grain, &c.	1 10 0	0 15 0
MILK, CREAM, BUTTER: Fat only	0 5 0	0 2 6
" " : Complete	0 15 0	0 7 6
WATTLE BARK AND TEA: Tannin	0 5 0	0 2 6
CATTLE DIPS: Qualitative analysis of 1 to 3 principle constituents	0 10 0	0 5 0
Quantitative analysis of 1 to 3 principal constituents	1 1 0	0 10 6
INSECTICIDES :		
Qualitative analysis each constituent	0 5 0	0 2 6
Quantitative " " " "	0 10 0	0 5 0

Scale No. 1 is applicable to samples handed in by merchants and Dealers, and where trade interests are involved.

Scale No. 2 is applicable to samples forwarded by *bona fide* Farmers and Gardeners.

All fees are payable in advance.

Samples will be accepted at the discretion of the Director, and must be properly selected and labelled.

The Department reserves the right to publish the results of any analysis performed by it; and, where such is deemed of sufficient public interest, it will remain at the discretion of the Director to remit any charges hereunder.

All samples must be addressed to the Chemist, Central Experimental Farm, Cedara

TREES FOR SALE.

To encourage tree-planting, transplants and seeds of forest trees are supplied by Government, so far as in stock, at the undermentioned rates, exclusive of carriage, from the Government Nursery, Central Experimental Farm, Cedara.

Transplants of Eucalyptus, Pines, Acacias, Casaurinas, Cupressus, etc., about 25 trees in each tin, at 8s. 4d. per 100 trees. Trees in separate tins at 1s. each.

Transplants of scarce kinds, larger trees, or surplus stock, when available, will be charged at special rates, which will be furnished on application.

Tree seeds, in variety, at 6d. per packet. Price per pound, which fluctuates, will be furnished on application.

Package and postage of seed, when required, charged 1s. per lb. extra.

Orders cannot be accepted for a smaller number than 100 trees.

PURCHASE OF TREE SEEDS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible :—

Admittance of Students to the School of Agriculture.—House Master, Cedara.
Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Afforestation, Timber Trees and Seeds.—Chief Afforestation Officer, Cedara.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.
 Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.
 Fruit.—Orchardist, Cedara.
 Accounting Business.—Accounting Clerk, Cedara.
 Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.
 Apiculture — Apiarist, Cedara.

E. R. SAWER,

Director, Division Agriculture and Forestry, Cedara.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

Charges in respect of Cattle and the Meat of Cattle.	Calves up to one year old.	Cattle over one year old.	
		Rate per single head.	After reaching 100 head in month.
<i>Abattoir.</i>	s. d.	s. d.	s. d.
1. Receiving, per head...	0 3	0 6	0 3
2. Killing and Dressing, per head...	2 0	3 6	2 9
3. Disinfectants...	0 1	0 1	0 1
4. Cleaning Tripes, each...	0 6	0 6	0 6
5. " Sets Feet, per set...	0 6	0 6	0 6
6. " Calves' Heads, each ..	0 9	—	—
<i>Bagging Charge</i>			
1. Per Body of Beef...	1 3	2 6	1 9
2. Bagging Labour, per body...	0 3	0 6	0 3
Hessian, 3d. per yard.			
<i>Special Storage Rates for Chilling up to 72 hours.</i>			
1. Chilling Beef, per body...	1 3	2 9	1 9
2. Chilling Offal, per set...	0 6	1 0	0 6

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.
 Department of Agriculture, Maritzburg, 21st December, 1908.

Publications Issued by the Department of Agriculture.

THE following publications, issued by the Department of Agriculture, are still in print, and copies may be obtained free (except those with prices attached) upon application to the office of the *Agricultural Journal*, Department of Agriculture, Pietermaritzburg. The figures in square brackets (e.g. [1904]) are the years in which the various publications were issued.

No. BULLETINS.

- 2.—"Manures on the Natal Market, 1902," by Alex. Pardy, F.C.S., Analyst. [1902.]
- 4.—"Manures on the Natal Market, 1903," by Alex. Pardy, F.C.S., Analyst. [1903.]
- 7.—"Tree-planting in Natal," by T. R. Sim, F.L.S., Conservator of Forests. [1905.]
(Price 2s. 6d., post free.)
- 10.—"Manures on the Natal Market, 1905," by Alex. Pardy, F.C.S., Analyst. [1905.]
- 11.—"East Coast Fever," by S. B. Woollatt, Principal Veterinary Surgeon. [1906.]
- 12.—"Manures on the Natal Market, 1906," by Alex. Pardy, F.C.S., Analyst. [1906.]
- 13.—"Report on the Disease known as 'Bluetongue' in Sheep," by H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E., Govt. Bacteriologist and Director, Govt. Laboratory. [1908.]
- 14.—"Poultry-Keeping in a Simplified Edition for Farmers," by F.C. [1908.]
- 15.—"The Export of Citrus Fruit," by Claude Fuller. [1909.]
- 16.—"Some Common Bagworms and Basketworms," by Claude Fuller. [1909.]
- 17.—"Dipping and Tick-Destroying Agents," by H. Watkins-Pitchford, F.R.C.V.S., F.R.S.E., Govt. Bacteriologist, Natal, and Director, Govt. Laboratory, [1909.] (For further Report, see under "Reports")

REPORTS.

- Annual Report of the Agricultural Department, 1902. Includes Reports of the Director of Agriculture, Entomologist, Conservator of Forests, Dairy Expert, Editor *Agricultural Journal*, etc.) [1903.]
- Report of the Secretary, Minister of Agriculture: January 1, 1903, to June 30, 1904. [1905.]
- Report of the Secretary, Minister of Agriculture, for the year ended 30th June, 1905. [1905.]
- Report of the Secretary, Minister of Agriculture, for the year ended 30th June, 1906. [1906.]
- (For a continuation of the statistics given in these reports see reprint "Natal's Progress in 1906," noted below.)
- Fourth Report of the Government Entomologist, 1903-4. [1905.]
- Fifth Report of the Government Entomologist, 1904-5. [1906.]
- Sixth Report of the Government Entomologist, 1905-6. [1907.]
- Division of Agriculture: Administration Report, 1907-8. [1908.]
- (The Third Report of the Entomologist is included in the "Report of the Agricultural Department, 1902," noted above.)
- Report of the Conservator of Forests, 1902. [1903.]
- Interim Report of the Conservator of Forests up to December 31, 1905.
- Report of the Principal Veterinary Surgeon, for year ended 30th June, 1906. [1907.]
- First Annual Report of the Land Board, 1905. [1906.]
- Annual Report of the Land Board, 1906-7.
- Annual Report of the Land Board, January, 1907—March, 1909. [1909.]
- Second Report on Dipping and Tick-Destroying Agents. By H. Watkins-Pitchford, F.R.C.V., F.R.S.E., Govt. Bacteriologist, Natal.

MISCELLANEOUS REPRINTS, ETC.

Black Spot ("Letter Book Pages": reprinted from *Journal*)

Mealie Grub (do do)

Mosquitoes (do do)

Woolly Aphis (do do)

Co-operation. By E. T. Mull ns, Secretary, Minister of Agriculture. (Reprinted from *Journal*, 1907.)

Citrus Fruit Export. (Reprinted from *Journal*, 1907.)

Natal's Progress in 1906. (Reprinted from *Journal*, 1907.) The statistics contained in this paper are on the same lines as those in the Annual Reports for previous years of the Secretary, Minister of Agriculture.

Natal's Progress in 1907. By H. J. Choles, F.S.S. (Reprinted from *Journal*, 1908.)

Natal's Progress in 1908. By H. J. Choles, F.S.S. (Reprinted from *Journal*, 1909.)

Fibre Cultivation. (Reprinted from *Journal*, 1907.) The paper is a summary of Bulletin No. 13 of the Department of the Interior, Bureau of Agriculture, Manila.

The Fibre Industry of Mauritius. By Leonard Acult, J.P., Tongaat; Member of the Land Board, Natal. (Reprinted from *Journal*, 1907.)

South African Products Exhibition, 1907. Report of T. R. Sim on the Natal Exhibits. (Reprinted from *Journal*, 1907.)

Poplar Timber for the Local Manufacture of Matches. By E. R. Sawyer, Director, E.S. (Reprinted from *Journal*, 1903.)

Soy Beans: Their Cultivation and Uses. By H. J. Choles. (Reprinted from *Journal*, 1910.)

Agricultural Industries and Land Settlement in Natal. [1907.]

Judging Fruit, Flowers, Plants and Vegetables at Shows. By T. R. Sim, F.L.S., Conservator of Forests. [1906.]

Model Rules for Agricultural Co-operative Societies. (Price 1s., post free.)

Brands Allotted to Infected Magisterial Divisions.

The following is a list of the brands which have been allotted to the several infected Magisterial Divisions:—Durban County, D. 2; Alexandra County, A. 2; Lower Tugela, T. 2; Mapumulo, S. 2; Inanda, B. 2; Umsinga, U. 2; Dundee, X. 2; Vryheid, V. 2; Ngotshe, H. 2; Paulpietersburg, P. 2; Nongoma, G. 2; Mahlabatini, L. 2; Ndwedwe, N. 2; Weenen County, W. 2; Umvoti, F. 2; Hlabisa, K. 2; Eshowe, E. 2; Ladysmith, R. 2; Babanango, O. 2; Ladysmith, East of Line outside infected area, R. 3; Utrecht, Z. 2; Krantzkop, 2 K.; Umvoti Location, 2 F.; Ladysmith, West of main line of Railway, R. 3 on left neck; Pietermaritzburg City, 2 P.; Umlazi Location (Upper Umkomanzi portion), 2 U.; Umgeni Division, west of line, J. 2; Lion's River, east of line, 2 H.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement after 25th April next. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 131.—Age 20. Was a student at College of Agriculture, Cape Colony, where he gained a diploma. Has also won prizes for butter making at the Rosebank and Port Elizabeth Shows. Has been in the services of the Orangia Creamery Co., Bethlehem, which he left on account of conditions of employment not being suitable to his requirements.

No. 132.—Age 37. Has had nine years experience as Assistant and Manager on Tea Estate in Assam, and has a thorough practical knowledge of tea making in all its Departments. Would like to obtain an appointment in a Tea Garden in Natal. Has a knowledge of several Indian languages.

No. 133.—Desires appointment as Farm Manager. Has had a thorough knowledge of growing and packing fruit, also lucerne growing and hay making. Has also had experience in Ostrich and Stock farming.

No. 134.—Age 37. Wishes to obtain experience on an Ostrich farm for a year. Would be willing to invest £700 at the end of the term of probation, and on the expiry of a year's partnership would be willing to increase that sum to £1 000.

No. 135.—Age 35. Has a knowledge of poultry and bee-keeping. Total abstainer. Non-smoker. Good references. Is anxious to get on to a farm.

No. 136.—Wishes to secure employment on an Ostrich farm. Very good references.

No. 137.—Understands carpentry and wagon making. Is anxious to secure a position on a farm.

No. 139.—Age 25. Seven years' experience in mixed farming in Springfield District.

No. 140.—Age 25. Colonial born. Has had 3 years experience on farm. Two years in the Mooi River Division, and one year Dairy Farming in the Transvaal. Good references; speaks Zulu.

No. 141.—A married man seeks employment on a farm, has had much experience with stock. Understands Native language.

No. 142.—Age 36. Tea Planter, twenty years experience, India, Ceylon and Natal. First class references and gold medalist. Expert knowledge of Tea factory engineering, planting, and manufacture—New openings a speciality. Fluent Indian linguist, and capable business man. Wishes to take over complete charge of large Tea concern. Liberal salary expected, and first class work guaranteed. Correspondence invited from Companies or Capitalists.

No. 143.—Experience on gardening and agricultural work. Wishes to obtain situation on a wattle plantation, stock, agricultural, or mixed farm. Would prefer to be near Maritzburg if possible but must be in Natal.

No. 144.—Desires employment on a farm in any capacity. Is the son of a farmer in Wiltshire, and has been in S. A. since 1900. Has had some experience on farms in this country.

No. 145.—An experienced Natal farmer finds it necessary to leave his farm on account of the near approach of East Coast Fever, and would be glad of a position as manager on an estate or to work one on shares. Has a good knowledge of general agriculture, and of all kinds of live stock, which he was accustomed to handle on Australian Stations.

No. 146.—An experienced stock and agricultural farmer desires position on a farm. Has had 25 years experience of mixed farming. Speaks and writes Dutch and English. Also speaks Zulu, and is accustomed to handling of coolies. Good references.

No. 147.—Desires to obtain a situation as manager or under manager on a farm. Has had a great deal of experience with all kind of farming, stock, mixed, and coast. For the last ten years has been manager of a farm on the Coast, and prior to that he was engaged in farming in the Dundee and Harrismith districts respectively, when he took many prizes for stock on various Agricultural Shows. He has had much experience with machinery also and understands building. Offers first-class references. Can speak, read and write Dutch and can speak Kaffir. Is accustomed to managing Coolies.

No. 148.—Has a fairly good practical knowledge of farming in Ireland, and desires to obtain a situation on a farm in this Country.

149.—Understands farming and is a good Zulu linguist. Desires situation on a farm more especially as manager. He'ds a certificate for book-keeping.

No. 150.—Age 21, desires to obtain a situation on a farm. Can fence, plough, is handy with carpenter's or engineer's tools, understands the Cream Separator, has had some experience in hay making, knows how to manage a gang of natives and can speak the Zulu language. States he is not afraid of hard work, and is strong and healthy; is an abstainer and does not smoke. Will work 6 months at a nominal salary with board and lodging free.

Farmers requiring good, steady farm hands would do well to communicate with Ensign Anderson, of the Salvation Army Shelter, Maritzburg, who constantly has good men at the Shelter who would be glad of employment at reasonable rates. Ensign Anderson pledges himself not to recommend for employment any but those he is satisfied will give satisfaction to their employers. He will be pleased to enter into correspondence with any farmer who may address him on the subject.

EMPLOYMENT FOR GIRLS.

The Minister of Agriculture has received a letter from the Chairman of the Transvaal Land Settlement Board, stating that he has been asked by several correspondents in England if there are any openings in South Africa, such as in creameries, for girls trained at Bromsgrove Colonial College and other such training centres in England. We should be glad to hear from any institutions or farmers in Natal who may be in a position to offer situations to girls who have been trained at such Colleges, when we shall be pleased to place them in communication with the Chairman of the Transvaal Land Settlement Board.

Farm Apprentices' Bureau.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- No. 3. Age 24. Colonial born. Has a knowledge of bookkeeping.
- „ 15. Age 19. Is desirous of learning farming.
- „ 25. Age 23. Bricklayer by trade. Is anxious to get on a farm.
- „ 27. Age 19. Has had one year's experience on a farm in the Cape Colony.
- „ 40. Age 24. Has had a little experience of farm life. Understands bee-keeping. Is anxious to get on a farm.
- „ 53. Age 17. Has had 18 months' experience of farming in Zululand. Speaks Zulu. Understands cattle and horses.
- „ 56. Age 20. Strong, tall and healthy, good rider, fond of stock, and has had some years experience of general farming. Small salary required with board and lodging.
- „ 57. Has had two years experience on a farm. Speaks Zulu and has a slight knowledge of Dutch. Is anxious to get on to a farm.
- „ 58. Age 16. Is a good rider and has a little knowledge of general farming, is very quick and willing to learn and not afraid of work. Is strong and healthy. Desires to get on a stock or agricultural farm.

PREMIUM OFFERED.

We have received an application from London in which an applicant expresses his desire to learn farming in Natal, for which he is willing to pay a premium to a first-class farmer who may be willing to take him on to his farm. He has had some training at an Agriculture College in England. We shall be glad to hear from any Natal farmers who may be willing to enter into an agreement with our correspondent for this purpose.

East Coast Fever Advisory Committees.

(NOTE.—Owing to sparse European population, the following Magisterial Divisions have no Advisory Boards: Ubombo, Mapumulo, Ingwavuma, Mahlabatini, Ndwandwe, Nkaandhla, and Hlabisa.)

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THE NATAL SPRAY PEN.

With hood and side guide-rails removed to show system of piping. Head and floor sprays open, sprays at sides closed. These sprays are being operated, as shown, at side of pen by levers, and can be opened singly or together, as desired.

(See "*Dipping and Dipping Agents*," by Mr. H. Watkins-Pitchford, in present

*The Natal Agricultural Journal.****The Causes of Soil Fertility.***

THE Agricultural Sub-section of the British Association is becoming increasingly interesting with each year's meeting of the Association, and this year the papers read were of especial interest and importance. Those which have appealed to us most are, the opening paper by the Chairman of the Sub-section, Mr. A. D. Hall, M.A., F.R.S., of Rothamsted fame, on the Causes of Soil Fertility, and one by Dr Hutchinson, announcing a discovery he has made in regard to the part played by soil organisms and how their natural balance may be disturbed by artificial means so as to favour increased activity of those particular micro-organisms that are, to some extent at least, responsible for fertility. Of other papers read, one on Sugar Beet Cultivation has naturally attracted a good deal of attention in England in view of the endeavour which is being made there to establish a beet-sugar industry.

A study of Mr. Hall's paper is likely to prove instructive to South African agriculturists, and we accordingly propose in the present article to follow it in some of its most important points. The paper was written with a view to giving an account, from an historic point of view, of what Mr. Hall described as the ebb and flow of ideas as to the causes of the fertility of the soil: in other words, the greater or less power which a piece of land possesses of producing crops under cultivation, or the causes which make one piece of land yield large crops when another piece alongside only yields small crops.

Dealing with the chemical researches of Van Delmont and Boyle, Mr. Hall observed that some instinct seemed to have led them to regard nitre as one of the sources of fertility. As the result of experimentation by Sir Kenelm Digby, John Mayow, and others, the association of nitre with the fertility of the soil became so general that as far back as 1675 John Evelyn wrote: "I firmly believe that, where saltpetre can be obtained in plenty, we shall not need to find other composts to ameliorate our ground"; while Henshaw expressed his firm conviction that the salt found in vegetables and animals was but the nitrate universally diffused

throughout all the elements, and must therefore make the chief ingredient in their nutriment, and by consequence their generation. By about 1840 it had been definitely settled what the plant was composed of and whence it derived its nutriment, namely, from the carbon compounds, which constituted nine-tenths of the dry weight, from the air the nitrogen, and the ash from the soil. Little as he had contributed to the discovery, Liebig, by his brilliant exposition and the weight of his authority, drove this broad theory of plant nutrition home to men's minds.

It was Daubeny, Professor of Botany and Rural Economy at Oxford, the real founder of a science of agriculture in the United Kingdom, who first pointed out the enormous difference between the amount of plant food in the soil and that taken out by the crop. It was Daubeny who by his experiments arrived at the conclusion that any normal soil contains the material for from fifty to a hundred field crops. If, then, the growth of the plant depended on the amount of this material that it can get from the soil, why was that growth so limited and why should it be increased by the supply of manure, which added only a trifle to the vast stores of plant food in the soil? A turnip crop, for example, would take away only about 30 lbs. per acre of phosphoric acid from a soil that might contain about 3,000 lbs. per acre. Yet, unless to the soil were added about 50 lbs. of phosphoric acid in the shape of manure hardly any turnips would be grown. Daubeny then arrived at the idea of a distinction between active and dormant plant food in the soil. The chief stock of these materials, he concluded, was combined in the soil in some form that kept it from the plant, and only a small proportion from time to time became soluble and available for plant food. He argued that, since plants only take in materials in a dissolved form, and as the natural solvent was water percolating through the soil more or less charged with carbon dioxide, therefore in water charged with carbon dioxide he would find a solvent which would extract from the soil just that material which could be regarded as active and available for the plant.

Exactly the same line of argument was revived about twenty years ago, and all over the world investigators began to try to measure the fertility of the soil by determining as available plant food the phosphoric acid and potash that could be extracted by some weak acid. A large number of different acids were tried, and, although a dilute solution of citric acid is at present the most generally accepted solvent, Mr. Hall expresses the opinion that we should come back to water charged with carbon dioxide as the only solvent of its kind for which any justification can be found. At the same time, he adds, whatever solvent is employed to extract from the soil its available plant food, the results fail to determine the fertility of the soil, because we are measuring but one of the factors in plant production, and that often a comparatively minor one.

In fact, some investigations have gone so far as to suggest that the actual amount of plant food in the soil is a matter of indifference. This view, in Mr. Hall's opinion, merits careful attention, because it insists that the chief factor in plant production must be the supply of water to the plant, and that soils differ from one another far more in their ability to maintain a good supply of water than in the amount of plant food they contain.

Proceeding, Mr. Hall pointed out that the oxidation of ammonia and other organic compounds of nitrogen to the state of nitrate is one of the first actions in the soil which was proved to be brought about by bacteria. In all cultivated soils two groups of bacteria exist which oxidise ammonia to nitrates in which form the nitrogen is available for the plant. Investigation has shown that the rate at which nitrification takes place is largely dependent on operations under the control of the farmer. The more thorough the cultivation the better the drainage and aeration, and the higher the temperature of the soil the more rapidly will nitrates be produced. A supply of combined nitrogen in some form or other, Mr. Hall went on to say, is absolutely indispensable to plants, and, in turn, to animals. Yet though we live in contact with a vast reservoir of free nitrogen gas in the shape of the atmosphere, until comparatively recently we knew of no natural process except the lightning flash which would bring such nitrogen into combination. Plants take combined nitrogen from the soil, and either give it back or pass it on to animals. The process, however, is only a cyclic one, and neither plants nor animals are alone able to bring fresh material into the account.

It has been found at Rothamsted, Mr. Hall says, that the plot on the permanent wheat field which never receives any manure has been losing nitrogen at a rate which almost exactly represents the difference between the annual removal of the crop and the receipts of combined nitrogen in the rain. Only a very small fixation of nitrogen can be further postulated to balance the other comparatively small losses in the drainage water or in the weeds that are removed, but on a neighbouring plot which has been left waste for the last twenty-five years so that the annual vegetation of grass and other herbage has fallen back to the soil, there has been an accumulation of nitrogen representing the annual fixation of nearly 100 lbs. per acre. One of the Rothamsted soils contains normally about 7,000,000 bacteria per grain, a number which remains comparatively constant under ordinary conditions. Heating reduced the number of bacteria to 400 per grain, but four days later they increased to 6,000,000, and afterwards they increased to over 40,000,000 per grain. Investigation goes to show that the fertility of a soil containing a given store of nitrogen compounds is limited by the rate at which these nitrogen compounds can be converted into ammonia, which in its turn depends on

the number of bacteria present effecting the change, and these numbers are kept down by the large organisms preying on the bacteria. By suitable treatment, Mr. Hall says, these larger organisms can be removed, whereupon a new level of ammonia production and therefore of fertility is rapidly attained. Curiously enough, one of the most striking of the larger organisms is an amoeba, akin to the white corpuscles of the blood—the phagocytes, which, according to Metchnikoff's theory, preserve us from fever and inflammation by devouring such intrusive bacteria as find entrance in the blood. The two cases, however, are reversed. In the blood the bacteria are deadly, and the amoebae therefore beneficial, whereas in the soil the bacteria are indispensable and the amoebae become noxious beasts of prey. Men who grow cucumbers, tomatoes, and other plants under glass are accustomed to make up extremely rich soils for the intensive culture they practise, but, despite the enormous amount of manure they employ, they find it impossible to use the same soil more than two years. Then they are compelled to introduce soil newly taken from a field and enriched with fresh manure. Several of these growers have observed that a good baking of this used soil restores its value again—in fact, it becomes too rich, and begins to supply the plant with an excessive amount of nitrogen. Going back to the Georgics, we find there an account of a method of heating the soil before sowing, which has received its explanation only within the last year, but which, as Mr. Hall says, must in some form or other find its way back again into the routine of agriculture, thus reviving in modern form one of the early mysteries bound up with the practice of agriculture which culminated in a process of firing the soil preparatory to sowing the crop. This interesting question is, according to the summaries we have seen in our English contemporaries to hand, brought out in Dr. Hutchinson's paper referred to at the beginning of this article, and upon receipt of the full text of the paper we shall deal with the subject further in a future issue of the *Journal*.

In concluding his paper, Mr. Hall said that when Science, a child of barely a century's growth, came to deal with a fundamental art like agriculture, which went back to the dawn of the race, it should begin humbly be accepting and trying to interpret the long chain of tradition. It was unsafe for science to be dogmatic. The principles on which it relied for its conclusions were often no more than first approximations to the truth, and the want of parallelism which could be neglected in the laboratory, gave rise to wide divergencies when extended into the regions of practice. What he had endeavoured to show was the continuous thread which linked the traditional practices of agriculture with the most modern developments of science.



Ostrich Chicks for Sale.

A Durban reader writes us as follows:—"I have a letter from a friend at Rietfontein, Burghersdorp, C.C., asking me for information regarding farmers in this Province who are inclined to go in for ostrich farming. He states that he will have several nice chicks for sale in a couple of months. These are all out of the famous 'Old Jack' from Mr. H. Barber. My friend will be glad to communicate with any intending buyer." We shall be pleased to place any readers interested in communication with the gentleman referred to by our correspondent.

Earth-Nut and Soy Bean Thresher.

In our article on Farm Machinery, in the September issue of the *Journal*, we gave an illustration, it will be remembered, of an earthnut thresher manufactured at the Ellis Keystone Agricultural Works, U.S.A., and we also stated that we had written again to Mr. George Burgess, the general agent for the Ellis Keystone Works, asking him whether the thresher would be likely to be suitable for threshing soy beans. We have now received a reply from Mr. Burgess, which runs as follows:—"We have your letter of August 13, in which you wish to know how many bushels per day each size of our threshers will thresh, also whether they will thresh soy beans, and the prices of our machines f.o.b. New York. We are not prepared to give the exact freight rate from the factory to New York, and we do not keep up on freight rates as our goods are all sold f.o.b. factory, but the rate would be very small as it is only \$5.52 [2s. 2d.] per 100 lbs. from the factory to this point. If all conditions are favourable, that is if the vines are not too large and damp and full of grass, our different size machines will thresh and clean the following number of bushels of peanuts per hour: No. 1, 30 to 40; No. 2, 40 to 60; and No. 3, 60 to 80. Our 2-horse tread power or 4-h.p. gasoline engine will run our No. 1, a 4-h.p. steam or a 6-h.p. gasoline our No. 2, a 6-h.p. steam or 8-h.p. gasoline our No. 3. We are not prepared to fully re-

commend our threshers to thresh soy beans as we do not know personally as we have never seen a machine in operating threshing them; however, we have shipped several machines to Texas this season for that purpose. We have never seen yet any kind of grain our machines would not thresh, and have personally seen them thresh navy beans and cowpeas and the work was done satisfactorily." Mr. Burgess has sent us his price list, from which we note that the prices of the various peanut threshers run from \$115 (a little under £24) for a No. 1 Champion thresher and cleaner with 20-inch cylinder, to \$230 (a little under £48) for a No. 3 thresher and cleaner with 28-inch cylinder. A grain attachment can also be obtained, the price of one suitable for the No. 1 thresher being \$30 (£6 5s.). (These prices are all f.o.b. Pottstown, Pa., U.S.A.) We shall be pleased to forward this price list to anyone interested, upon application. We do not know that we can do anything further in the matter, having drawn attention to the machine and obtained particulars as to prices, etc.; and it now remains for anyone interested who may care to invest in one of these machines to proceed in the usual way, either importing direct or through a local machinery firm. Mr. Burgess' address is P.O. Box 182, Petersburg, Virginia, U.S.A.

Treatment of Hides for Export.

The Acting Trades Commissioner for South Africa in London has been prosecuting inquiries among Hamburg firms dealing in hides and skins as to the lines along which improvement of South African hides from a market point of view should be directed, and he has sent to the Department of Agriculture some of the results of his inquiries. One of the replies received we reproduce herewith, as the advice which it contains will be found of value by many South African exporters of hides. *Inter alia*, the letter in question states: "The selling value of the hides is diminished if they have many brands, and when the brand marks are put on valuable spots of the hides; they ought to be put on the offal parts. This is a point that ought to be impressed on cattle owners. Hides are exported, as you know, 'dried' or salted.' When exported 'dried,' care is to be taken that they are well poisoned so as to prevent worms getting into the hides. They ought to be dried carefully, so as to avoid a shrivelled crumpled appearance. The flesh side ought to be kept as clean and smooth as possible. When exported 'salted' great care is to be taken that the salting is done efficiently so as to prevent the hides getting heated. In the River Plate the hides coming from the cattle are put in pickle for 24 hours and then spread out in a pile, each layer being covered with a layer of salt. They are kept about a fortnight in this pile so that the salt thoroughly penetrates into the hides. When shipped the hides are spread out flat in the vessel and also covered with salt, with some

little pickle on the top to keep the hides fresh. In Havana the salted hides are bundled, two in a bundle, but this would not do for hides coming from or passing through hot climates and for long voyages. Great care is to be taken in the flaying so that the hides should not be cut or stabbed, which is the greatest defect hides can have."

Introduction of Sheep Into Natal.

Under Proclamation No. 122, 1910, the entry of sheep into the Province of Natal from any of the other Provinces of the Union of South Africa without the necessity of dipping such sheep is authorised subject to the condition that the owner shall have obtained, and shall produce for inspection whenever required, a certificate in the form of the schedule below, signed by a duly appointed sheep or stock inspector of the district or area of the Province from which the sheep are brought, showing that the sheep have been personally inspected not more than fourteen days previous to the arrival of the sheep at the Natal border, and that the sheep are free from scab. Any person introducing any sheep into Natal in contravention of the provisions of this Proclamation will be liable to a fine not exceeding £50.

The following is the Schedule referred to above:—"I do hereby certify that I have this day examined the sheep described hereunder (intended for introduction into the Province of), and find the said animals to be entirely free from disease known as scab. Signature Title Dated at this day of 191 Name of owner; Number of animals; Marks

Introduction of Sheep Into O.F.S.

A similar Proclamation to the above has been issued (No. 125, 1910) governing the introduction of sheep into the Orange Free State. From and after the 15th October, sheep or goats accompanied by a certificate (in the form of the schedule below) to the effect that they have been examined on a date not more than fourteen days previous to the date of introduction and found free from scab, duly signed by an authorised sheep inspector or stock inspector of the district or area in the Province from whence such animals come, may be introduced into the Province of the Orange Free State from any other Province of the Union of South Africa without being previously dipped. Any person introducing or attempting to introduce into the Orange Free State sheep or goats in contravention of this Proclamation, or sheep or goats which he knows to be infected with scab or which he has reason to believe are

so infected will be liable on conviction to a fine not exceeding twenty pounds, or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding three months unless such fine be sooner paid.

The following is the Schedule referred to in the foregoing:—"I do hereby certify that I have this day examined the sheep (or goats) described hereunder (intended for introduction into the Province of), and find the said animals to be entirely free from the disease known as scab. Signature Title Dated at this day of 19.... Name of owner; Number of animals, sheep and goats; Marks

Introduction of Cattle, Hides and Skins into Free State.

By a Proclamation dated 30th September (No. 120, 1910), the following prohibitions and restrictions have been brought into force as from the 15th October in respect of the introduction of horned cattle, hides, and skins into the Province of the Orange Free State from other Provinces of the Union:—(1) It shall be unlawful to introduce any horned cattle into the Province of the Orange Free State from the Provinces of Natal and the Transvaal and all cattle introduced in contravention of this Proclamation shall forthwith be confiscated; and, on an order being given by the Minister of Agriculture or his deputy, which the Minister or his said deputy are hereby authorised to give, shall be destroyed. (2) Permits may be granted by the Principal Veterinary Officer of the Orange Free State for the introduction into that Province from the Province of the Cape of Good Hope (a) of cattle other than from areas in which contagious or infectious disease has been declared by law to exist; provided, however, that cattle from the districts of Cape, Malmesbury, Clarendon, Paarl, and Stellenbosch may be so introduced if accompanied by a certificate in the form set forth in the Schedule to this Proclamation, dated not more than six weeks previous to the date on which such cattle are to be trucked in the Cape Province, and signed by a Government veterinary surgeon, or other qualified veterinary surgeon, approved by the Minister of Agriculture; (b) of draught cattle engaged in *bona fide* transport work to and fro across the border between the two two Provinces; such permit shall be available for six months, at the expiration of which period it may be renewed; (c) of cattle which have been imported for breeding purposes from oversea and have passed through the Province of the Cape of Good Hope direct by rail accompanied by a special permit from the Principal Veterinary

Officer of the Orange Free State and subject to such conditions as he may impose. (3) The Principal Veterinary Officer may at any time cancel any permit granted in terms of Sub-section (a) or (b) of the preceding regulation, should he deem it necessary so to do.

(4) Any person desirous of introducing cattle into the Orange Free State under these regulations shall first make application to the Principal Veterinary Officer for a permit, stating (a) the number of cattle which it is desired to introduce; (b) the particular area or district from which they come; (c) the route by which they will travel; (d) the ultimate destination of each animal, and, if required, shall produce a certificate from a Government veterinary surgeon or other qualified veterinary surgeon approved by the Minister of Agriculture to the effect that such animals are free from disease and have not come from an infected area. (5) Hides or skins may be introduced into the Province of the Orange Free State from any other Province in the Union of South Africa on production of a sworn affidavit that they have been thoroughly dipped in or sprayed with a solution of arsenic mixed in the following proportions: Mix one pound of arsenite of soda with a gallon of hot water and when completely dissolved add cold water up to fifty gallons.

Any person contravening any of the provisions of this Proclamation or wilfully obstructing any person in the due execution of any of the provisions hereof shall be liable on conviction to a fine not exceeding fifty pounds, or, in default of payment, to imprisonment, with or without hard labour, for any period not exceeding six months, unless such fine be sooner paid. Orange River Colony Proclamations Nos. 8 and 14 of 1903, Nos. 22 and 51 of 1908, and No. 113 of 1909, and Union Proclamation No. 10 of 1910, shall be and are hereby superseded and withdrawn.

The following is the Schedule referred to in the foregoing regulations:—"I do hereby certify that the undermentioned cattle have been subjected by me to the tuberculin test, and have given no indication of the presence of the tuberculosis. Number and general description of cattle Date when tested Place from which sent Owner's name and address Name of person in charge Place in the Province of the Orange Free State to which cattle are being sent Signature of veterinary surgeon. Countersigned Chief Veterinary Surgeon.

Restrictions of Entry of certain Products into Free State.

A Proclamation (No. 119, 1910), has been issued by His Excellency the Governor-General, restricting the importation of "articles affected with, or suspected to be affected with, or which might be the means of carrying any disease," into the Orange Free State from Natal. The Proclamation prohibits the introduction into the former Province from the latter of the following articles:—(a) Any grass, grass-hay, animal manure, moss or other vegetable matter (except lucerne, lucerne-hay and plants or cuttings introduced in accordance with the Plant Import Regulations), whether such material may be used as packing for any article or thing, or otherwise; (b) any timber or wood, including firewood, except as hereinafter provided, namely—(i) newly manufactured timber, vehicles (except Scotch carts and wagons which have been in use), and bamboo whipsicks, may be introduced without restriction; (ii) Scotch carts and wagons (which have been in use) may only be introduced if, before crossing the border, they are thoroughly sprayed with a solution made by dissolving 1 lb. of arsenite of soda in 20 gallons of water under the supervision of a member of the Orange Free State Border Guard, who shall furnish a certificate to that effect in the form prescribed (*see below*); (iii) barked wattle poles (including those intended for firewood) or other barked poles and second-hand manufactured timber which has been used in the construction of any building or article may be introduced if accompanied by a certificate in the form referred to above, signed by a justice of the peace or stock inspector of the Province of Natal or a member of the Natal Border Guard of this Province and bearing date not more than seven days previous to that of the said introduction.

The form referred to above is as follows:—"I hereby certify that the undermentioned articles have been disinfected by being dipped in or thoroughly sprayed with a solution made by dissolving 1 lb. of arsenite of soda in 20 gallons of water. Description of timber or vehicles Date Signed (Justice of the Peace or Stock Inspector of the Province of Natal or member of Natal Border Guard of Orange Free State) Address.

The Proclamation provides that "Any person introducing or attempting to introduce, whether as principal, agent or servant by himself or another, any article into the said Province in contravention of any of the above provisions, shall be liable to a penalty not exceeding

fifty pounds, or, in default of payment, to imprisonment, with or without hard labour, for a period not exceeding six months." Proclamation No. 100, 1909, of the Orange River Colony, is cancelled.

Commerce and Industries Commission.

His Excellency the Governor-General has appointed a Commission, consisting of Sir Thomas Cullinan and Messrs. William Macintosh, William Anderson Martin, Joseph Mossop, Charles George Smith, Anthony Gysbert Viljoen, and Cornelius Hermanus Wessels, "to inquire into the conditions of trade and industries and other matters appertaining thereto." Messrs. G. O. Smith and Charles Lepper have been appointed joint secretaries to the Commission.

Foundation Comb.

Messrs. Cairncross & Zillen, of Church Street, Pretoria, have favoured us with samples of foundation comb of their own manufacture from South African beeswax. These samples are in two grades, heavy and light, and should prove quite acceptable to bee-keepers. Messrs. Cairncross & Zillen are to be complimented upon their enterprise in importing and fitting up the machinery for the manufacture of both super and brood foundation comb, and we hope our bee-keepers will support this local industry. We shall be glad to show these samples to anyone interested who may care to call at this office.

Corn Grading Regulations.

The Right Honourable Minister of Agriculture has been pleased to order that the grading regulations in regard to maize and Kafir corn (published in our last issue) shall come into force on the 1st November, instead of on the 1st September as previously stated. The regulations have been revised, and will be found elsewhere in the present issue.

S. A. Agricultural Union.

When these lines fall under the eyes of our readers the Annual Conference of the Inter-Colonial (or, as it is proposed to call it in future, the South African) Agricultural Union which is this year to be held at Capetown—will have been and gone. The executive committee has issued the agenda paper of the Conference, and as the contents of that paper have already been published in the columns of the daily press we do not propose to publish it here. We hope, however, to be in a position to give a full report of the proceedings of the Conference—which will be an especially interesting one this year—in our next issue. On the agenda paper as it

at present stands there are 54 new resolutions to be considered, which number, as has been found by experience in the past, will probably be augmented to quite 60 by fresh resolutions decided upon after the printing of the agenda paper. Among the subjects dealt with by the 54 new resolutions are: Scab, Improvement of Merino Flocks, Judges from Oversea, Free Railway Tickets to Judges, Refunds on Agricultural Show Stock, Treatment of Live Stock in Transit on Railways, Model Prize Lists, Working of Shows, Farmers' Trip to Europe, Ostrich Export, Distribution of Stud Horses, East Coast Fever, Inquiry into Stock Diseases, Tuberculosis, Stock Brands and Branding, Grain Breeding, Inspection and Grading of Produce, Forestry, Control of Weeds and Insect Pests, Farm Machinery, Grass Burning, Egg Laying Competitions, Labour Bureaux, General Statistical Bureau for S.A., Agricultural Board for S.A., Status of Provincial Agricultural Departments, Standard Weights and Measures, Land Settlement, Farm Telephones, Uniform Fencing Law, Best Varieties of Mealies.

In connection with the forthcoming Conference, the following letter which Mr. C. G. Lee has sent to the various sections of the Press is of interest. As some of our readers are doubtless aware, Mr. Lee was Mr. E. W. Evans' predecessor as President of the Inter-Colonial Agricultural Union. Mr. Lee writes:—"In many parts of this Province there are unmistakable signs of progress in pastoral, agricultural, and horticultural industries, this is admitted by all: causing much encouragement. But the development—with few exceptions—is isolated, and nothing like as general as it might be, mainly because the vast majority of farmers stand in sore need of more capital. Moreover, we as farmers do not utilise the power that would come to us by working co-operation for all it is worth. It is next to useless for a farmer here, and another there, calling for the use of capital at low rates of interest for development works. Such isolated requests have proved to be a hopeless way of setting about getting assistance, relief, or redress from standing drawbacks of whatever kind, whether they be want of capital, or fighting stock and plant diseases, or unsatisfactory prices for produce, or anything else. The sure and proved way lies along the road of organised co-operation, conducted through clubs, associations, societies, and such like organisations. Fortunately there is no need to wait to build up such bodies; they are in existence, but need strong support. An opportunity for giving this support to one of these organisations working on the broadest possible lines is now at hand. I refer to the Congress of the Cape Agricultural Union, which will be held in Capetown at the end of next month, at which gathering adequate representation will work great good."

“There is much that assures the forthcoming Conference being well attended by a large number of representative delegates. Nevertheless I write with the hope these lines may arrest the attention of some hard workers, who, for want of time or inclination, take little interest in what is going on outside their immediate and direct concerns, while they struggle against the many man-made and natural agricultural drawbacks in our good land; these workers—of whom there are not a few, may enquire: What good can the Agricultural Union do? What claim has it to be heard in the counsels of the country? Much, every way, is the reply. It is, amongst other things, the medium through which the patriotic concentrated voice of thousands of men and women can be heard, and has been heard in the past, at the Union’s gatherings. Town and country meet and take counsel together, touching the wisest measures for minimising the evil effects of drawbacks, also recommending State-aided schemes for general advancement, to decide upon means for self help, and to interchange valuable experiences for general welfare. The Union has its branches working in many districts; these consist for the most part of agricultural societies, holding annual agricultural shows, which provide opportunities for friendly competitions, and these act as a stimulant for sound progress. Moreover, the helpful work does not begin or end in the showyard during show days, but extends very much further by reason of the necessity and continuous activity of a number of members of each society, who freely give time and thought in preparing for forthcoming shows. In this connection meetings are held drawing together for mutual help all shades of politicians, thus giving a common platform where all may meet in advancing the great work of drawing the people to occupy the land in great numbers, and for them to do so under most modern methods.

“A fuller grasp of the wide field for beneficial labour occupied by Agricultural Societies comes when remembering that our Agricultural Shows are rapidly growing into exhibitions, showing not only what the land can produce in the shape of pastoral, agricultural and horticultural products (I include the poultry industry in the terms pastoral), but also what the inventor’s brain brings out in machines and appliances used for making land occupation more profitable and attractive. Again, other classes of exhibits demonstrate how far our home industrial arts have gone in the direction of manufacturing much of the country’s raw material into articles useful for man and beast, and also into things that add to the comfort and beauty of our homes, much of the manufacturing being pushed on by the laudable work of the ladies through their industrial societies. It goes almost without saying at present that the bulk of the work falls upon the shoulders of the comparatively few, nevertheless there

is ample proof on every side clearly revealing the encouraging fact that in proportion to the expansions of established societies and the forming of the new ones, so in a corresponding manner the workers increase. While on this point of starting societies permit me to say that the forming of new agricultural societies does not necessarily mean the building of new show yards, with all the costly fittings, to be used perhaps for two or three days in the year. In most instances such expenditure cannot be thought of, at least not at present, but the difficulty is amply met by a willingness on the part of established societies having yards, offering the necessary accommodation, and in other cases proposing semic amalgamation. Both of those schemes may be so arranged as to give any new society the full benefit for exhibitors of their district competing together for local prizes, and this sphere of exhibiting has time and again induced the more timid exhibitors to venture with success into wider fields of competition. For fear of being misunderstood, I must add the Cape Agricultural Union has many other branches besides agricultural societies, and all doing patriotically useful work, but time fails me to give a word about these."

Irrigation Matters.

In view of the appointment of Mr. F. E. Kauthack as Acting Director of Irrigation, all correspondence connected with irrigation in the Province of Natal should now, according to a notice in the *Government Gazette*, be addressed to the Acting Director of Irrigation, P.O. Box 444, Pretoria. Communications may, if preferred, be addressed to the Natal Branch of the Department, Maritzburg.

Mr. Pitchford's First Report on Dips.

So large has been the demand for Mr. Pitchford's first report on Dips and Dipping Agents that the first edition is now exhausted, and we have thought it wise, seeing that the demand continues, to re-publish the report in the pages of this *Journal*. The report will accordingly be found in its entirety in the present number, and its appearance will, we think, be especially welcomed by the many new readers of the *Journal* since the report first appeared in our pages. Copies of the second report, upon which also there has been a good run, are still available, and will be sent to applicants upon request. Address applications to Editor, *Natal Agricultural Journal*, Maritzburg.

Dipping and Tick-destroying Agents.

By H. WATKINS-PITCHFORD, F.R.C.V.S., F.R.S.E.*

THIS report is intended to show the efficacy of certain preparations supplied for the dipping and spraying of cattle. The main object with which this enquiry was instituted was the ascertainment of the frequency with which such dipping agents could be used without risk or disability to the animals concerned.

Such safety in use, however, was deemed of importance only when conjoined with the ability of the agent under observation to destroy the tick.

The conclusions arrived at, therefore, must be clearly understood to be based, not only upon the reliability of an agent as a dip for general use at usual intervals, but chiefly upon its ability to permit re-application at a short interval without incurring damage to the animal system.

Most of the current cattle dips have come under review in this manner, and an endeavour has been made to compare the properties of these preparations under conditions as similar as possible.

Precise similarity of conditions of test has not been possible, inasmuch as the observations undertaken have extended over some period, during which the conditions of weather, intensity of tick infestation, etc., have varied, but such slight variations have not in my opinion influenced final results in any great degree.

The agents coming under observation have been as follows:—

- | | |
|----------------------------------|------------------------------|
| 1. Cooper's "Tixol" ; | 8. Holmes' Paste Dip ; |
| 2. McDougall's Dip ; | 9. "Ialine" Sheep Dip ; |
| 3. Quibell's Dip ; | 10. Electrolysed Sea-water ; |
| 4. Cooper's Powder Dip ; | 11. Arsenite of Soda ; |
| 5. Demuth's Dip ; | 12. Erkenbrach's Paste Dip ; |
| 6. Newton Chambers' "Izo-Izal" ; | 13. Alderson's Dip ; |
| 7. Thomas' Dip ; | 14. "Laboratory Dip" |

It will be seen from the attached schedules that most of these preparations were efficient tick killers, some of them acting efficiently in this respect when used in much higher dilutions than those recommended in the directions recommended accompanying the sample.

In view of the number of dipping agents to be enquired into at one time it was found impossible to construct for every such preparation a dip or receptacle in which complete submersion could be effected, especi-

* See Notes and Comments.—Ed.

ally as each preparation was examined in three separate dilutions, full strength (as recommended by the proprietors), three-quarters strength, and half-strength, as it was hoped that some of the dips under enquiry—even if too strong to bear frequent repetition in full strength—might give good results when used at less than the strength prescribed for ordinary long interval dipping. This arrangement, as will be seen, necessitated the use of a large number of different solutions for which tank accommodation was out of the question.

It was, therefore, decided to base the enquiry primarily upon each preparation when used in the form of a spray, as such spray solution could be freshly mixed in the quantity required, and so effect a saving of both time and material.

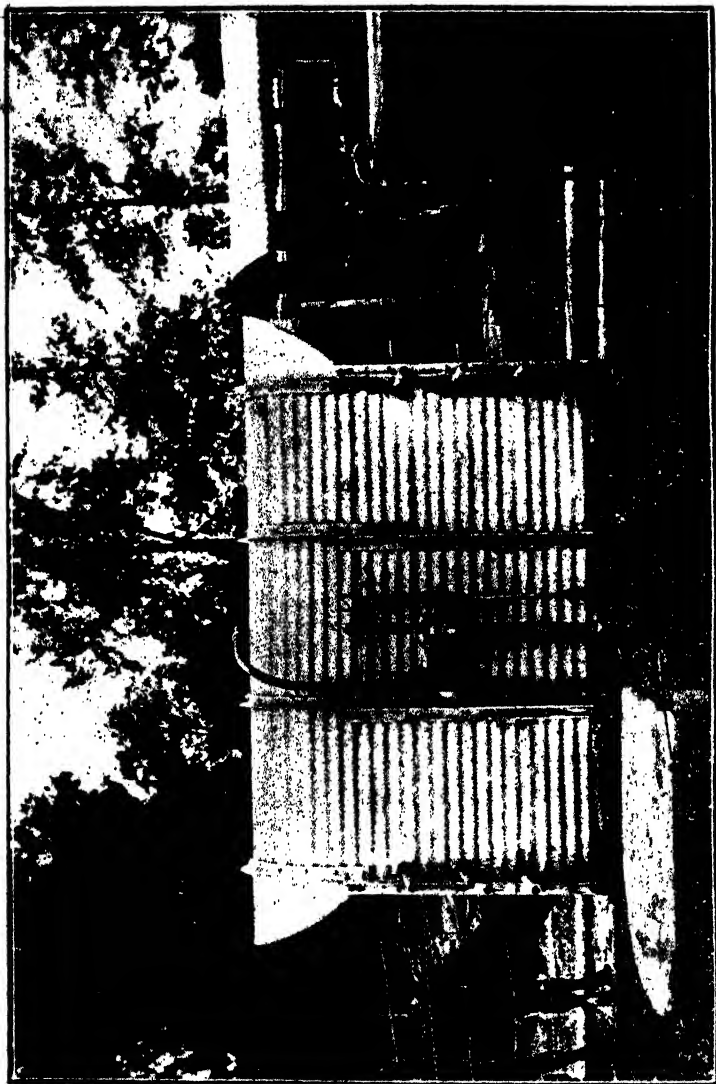
It was recognised, however, that the results derived from the use of a solution in spray form were not strictly comparable to the results given by a dip or bath in which complete submersion took place.

As, however, it has been frequently observed that the effect of a spraying fluid is increased or intensified when used in the form of a dip, no objection to the preliminary use of the spray—on the ground of severity of effect—could be brought forward. A preparation, therefore, which was found too strong to bear repeated application in the form of a spray was considered to be unsuitable for use when used at the same intervals of time in the form of a dip or bath.

This observation as to the difference of effect between the same fluid in the form of a spray and a dip has, I believe, been the experience of others who have conducted investigations upon the effect of such preparations in other parts of South Africa. In carrying out an exhaustive examination of the matter much difficulty has been experienced by reason of:—

- (a) The restriction of grazing on account of existing East Coast Fever quarantine regulations; and
- (b) The difficulty of obtaining and transporting to the Laboratory paddocks a number of cattle sufficient for the purpose of the enquiry, which difficulty arose also upon the same ground.

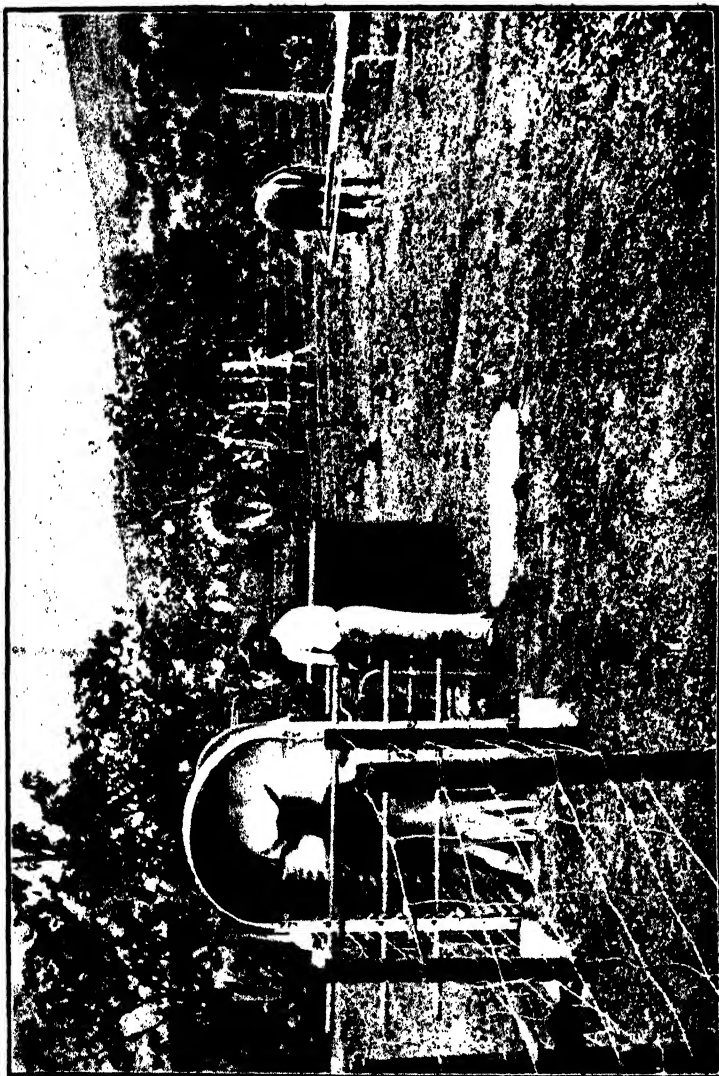
The maintaining of an adequate degree of tick infestation—in order to judge of the effect of the various preparations upon tick-infested cattle—was only effected with much difficulty by reason of the restrictions of the animals to small paddocks, which later rapidly became both eaten down and denuded of ticks by the frequent dippings to which the contained cattle were subjected. In order to meet this difficulty the Corporation of Pietermaritzburg was approached and was good enough to at once place at disposal some acres of the Town Lands contiguous to the Laboratory paddocks. Even with this advantage the difficulty has been



THE NATAL SPRAY PEN.

General view of Pen, showing actuating levers and pressure gauge, etc. The concrete block in foreground enclosed the pressure chamber. The controlling handle, shown projecting from the ground near this block, serves to direct the fluid from the pump either into the pressure chamber, or at conclusion of operations, to return it into the 400 gallon storage tank, shown on right.

(See "Dipping and Dipping Agents," by Mr. H. Watkins-Pitchford, in present issue.)



THE NATAL SPRAY PEN.

Front view, showing pump and horse gear, at moment of shutting off head spray and opening floor spray. The guide rails, of which the curved ends can be seen projecting, serve to keep the animal in the centre of the pen. In the foreground on left, is the drive from catching kraal, up which cattle are being driven. The draining slope beyond cannot be seen by reason of the cloud of spray in the pen itself.

(See "*Dipping and Dipping Agents*," by Mr. H. Watkins-Pilehford, in present issue.)



considerable of re-infecting the test animals with a sufficient number of ticks to judge of the action of the various dipping preparations. The artificial hatching of ticks has, therefore, been resorted to, but such expedient—by reason of the delay and trouble involved—has not given the satisfactory results which would have attended the natural infestation of cattle grazing in an unrestricted area. In spite of this difficulty, the results obtained were sufficiently conclusive in each case as to the tick-killing properties or otherwise of the preparations concerned.

Observations as to the safety of an application and the interval at which it could be repeated without danger presented no difficulty, but much time has been spent in making such observations and in recapitulating such results as seemed unusual or unexpected.

In the first instance six head of cattle were set aside for the investigation of each preparation (although in some instances of repetition of results as many as twenty or more animals have been required for a single dip), and these six were apportioned as shown in the tabular statements, *viz.*, two beasts for the full strength, two for the three-quarter, and two for the half strength solutions. In this way it has been possible to note the tick-killing properties of a dip and also the safety with which a certain dilution could be repeated at a short interval.

This question of interval between dippings has been considered of much importance in view of the life history of the tick, especially of the Brown tick (*Rhipicephalus appendiculatus*), so frequently responsible in one of its developmental stages for the transmission of East Coast Fever.

The interval, therefore, between application of the various solutions was made as short as possible in order to prevent the tick in question surviving and thus leaving the body of an infected host and further propagating the disease.

A dip which could be applied so frequently as to ensure the destruction upon a beast of all forms of tick life would obviously do much to limit the spread of the disease by reducing the number of pathogenic or disease-producing ticks and thus decreasing the chances of infection.

The problem of killing all parasites upon a beast every few days without involving the beast itself in danger by direct or cumulative effect of the repeated applications proved a somewhat difficult question, and it was upon this point of the interval at which applications could be repeated with safety that most of the preparations under review were found wanting.

Arsenic—the chief constituent upon which most of the dips depend for their killing or insecticide properties—is a strong irritant to the skin, and in addition is capable of occasionally storing up or accumulating

its poisonous properties and suddenly exerting such in the form of acute arsenical poisoning.

Too frequent application of such a fluid gives rise to an inflammation of the skin, showing itself by a "staring" of the coat, and a heat and soreness of the skin itself, which latter frequently becomes wrinkled in lines or cracked so deeply as to permit the oozing of blood and fluid from the fissures.

As the skin at back the of the knee-joint and front of the hock is generally involved great reluctance to move is noticed, and the pain and discomfort are frequently so great that the beast will lie down and die without making an effort in extreme cases to help itself. Wherever a note exists in the following schedules as to "cracking" or "peeling" it will be understood that the effect has been due chiefly or solely to the dip in question containing too high a percentage of arsenic, or to the form in which the arsenic has been combined with the other component parts of the dip. At the foot of each schedule will be found a brief resume of its contents, and, in looking through these, it will be noticed that, while some preparations are shown as being inefficient as regards their tick-killing properties, the majority are found to be so severe as to necessitate the discontinuance of the test by reason of the effect upon the system of the animal.

The necessity mentioned above for frequent cleansing of animals at short intervals led to the interval of four clear days, i.e., every fifth day, being determined upon as the shortest practicable time to which such interval could be brought with due regard to the safety of the beast and the destruction of ticks. This minimum time—four clear days—was found to be too severe a test for the majority of the preparations under examination to conform to, which preparations—though they proved quite efficient in tick-killing power—produced such grave local and constitutional disturbances as to necessitate their discontinuance after a few applications.

The difficulty of finding on the market a composition capable of wholly satisfying the above requirements led to the attempt to produce one, and as an outcome the dip referred to as "Laboratory Dip" in the schedule has received an extensive trial, and its composition will be found attached in the form of an Appendix, "A." After the component parts of this latter of Laboratory preparation has been successfully adjusted so as to give the desired result when used as a spray (see Schedule 15), it was found to be too strong used in 2,000 gallon bulk as a dip in which animals were completely immersed (see Schedule 19).

Further adjustments were therefore made (chiefly by alteration of the arsenical contents) and the final result is that shown on Schedule 21, in which it will be noticed that cattle have been put through this mixture

for sixty days at regular intervals of four clear days, and, while the cattle maintain their usual health, the ticks are destroyed.

The same fluid after two months' use when applied to grossly infested cattle in the form of a spray cleans them satisfactorily. It will, therefore, be seen that it is possible to dip cattle at such short intervals as once every fifth day without detriment to the beasts so dipped, and they can in this manner be kept practically free from tick infestation such as occurs in the short intervals between dippings. Even during such interval the dip has been noticed to exert to some extent a deterrent effect upon re-infestation (although on this point the difficulty mentioned above of securing thorough infestation by ticks under the conditions existing must be considered).

As far as I have been able to judge, cattle can be worked with safety directly after dipping in this "Laboratory Dip" when applied every fifth day. My opportunities of observing this point have been limited, but with a span of six oxen which have been repeatedly yoked as soon as dry after dipping and used for ploughing in heavy ground, no unfavourable results have ensued although such work has been continued day by day throughout the intervals from one dipping to another.

The question of ability to work after such frequent dippings is an important one to the owner of transport cattle or working oxen, and when the difficulties of safe and efficient dipping at short intervals have been met there remains the above difficulty of ensuring that no effects are produced preventing the animals so dipped from performing ordinary labour.

In one of the preparations shown amongst the annexed schedules a satisfactory result was given by the dip in question for many weeks, but when the oxen came to be worked it was found necessary to greatly increase the interval between dipping in order to avoid the risk of collapse and even death ensuing.

The only dip besides the Laboratory Dip which has been brought to my notice as being capable of frequent, safe, and satisfactory application even to working oxen is that in use at present upon the Nel's Rust Estate. Immersion in this dip takes place every seven days with cows and working oxen alike, and I am informed the cattle are kept virtually free from ticks and are capable of performing their usual work without distress.

This Nel's Rust dipping fluid is a modification of the Queensland dipping formula, and a copy of the formula used at Nel's Rust, which was given to me through the kindness of Mr. Alexander, is shown in Appendix "B" for the use of those who consider a weekly immersion a sufficiently short interval between dippings. Another practice in use at Nel's Rust is the separate dressing of the ears of all beasts either when emerging from the dip or in the yoke. It has frequently been observed

in the course of this enquiry that cattle will become divested of all their ticks with the exception of a few (generally Brown ticks) which persist in the ears, usually upon its edge or fringe. The practice, therefore, of applying a special dressing to the ear by means of a swab gives good results in these cases where the dip fails to kill all ticks, and the same procedure holds good in those cases where ticks are found to survive under the root of the tail. I am informed that at Nel's Rust where this procedure is systematically adopted the results leave nothing to be desired, while the trouble involved in this extra manipulation is only slight even where a large number of cattle is concerned.

It will be found, however, in the majority of cases where the Laboratory formula is employed that this separate treatment will not be found necessary, a fact probably owing to the higher percentage of arsenic present.

Following will be found appended the various schedules showing the manner in which the different dipping agents have comported themselves in their various strengths at an interval between applications of four clear days in each case.

It will be seen that no attempt has been made to compare the cost of the various preparations or to judge of the same from any preferential standpoint. All that has been attempted has been to ascertain the tick-killing properties of the preparation in question and the safety with which applications of the same could be made.

No critical observations have been made as to the species of tick concerned in the foregoing tests, although the Brown tick has been the subject of special notice in computing the tick-killing properties of any dipping fluid.

Where actual numbers of ticks are mentioned as surviving, it will be understood that an approximation only is meant. Much time, however, has been spent at each inspection in order to make this number as correct as possible.

At the foot of each schedule will be found a summary of its results in application.

It will be seen that all animals do not become equally affected by equal exposure to the spray or dip, and several instances can be noticed in which it was found necessary to cast one of the animals from a test on account of the severe skin reaction, while the companion animal remained unaffected.

Such constitutional differences are, of course, to be expected. Another point of interest to be observed is the frequency with which a

tolerance became established in beasts which threatened to develop inflammation of the skin after the third or fourth spraying or dipping, but which became habituated to the process by further repetition.

A slight amount of skin-irritation amongst a few animals after commencing the use of a fresh dip would not, therefore, appear to necessitate the immediate discontinuance of the use of a dipping fluid, but it is, of course, necessary to observe all such cases narrowly and to disuse any dip which threatens to exert its irritating effect to any serious extent.

The details given in Schedules 14 to 21 show the manner in which final results have been arrived at and the effect of the addition of various agents to the arsenical base, which latter, in the present state of our knowledge, must be looked upon as an essential constituent of all efficient dips for tick destruction.

The results given by the use of Arsenite of Soda alone will be found upon reference to Schedule 11, and the proportions shown there were taken as a rough index as to the arsenical content necessary in the preparation of a dip such as that shown in Schedules 14 to 21 ("Laboratory Dip"). According to the full strength of one pound of arsenite of soda (containing about 80 per cent. of arsenic) to twenty gallons of a diluting fluid was used, and this diluting fluid was arranged to contain Soap (in order to emulsify the other constituents and to produce a more lasting effect upon the skin), Paraffin (to act as a penetrating and tick-destroying agent which might assist also by its odour in reducing liability to tick attack), and Glycerine (as an emollient tending to counteract the roughening and irritating effect both of the arsenic and paraffin and to maintain sleekness of coat).

The results obtained from this mixture will be found on reference to Schedule 14, from which it will be seen that, while the animals are efficiently cleaned from their ticks, constitutional symptoms begin to set in after from four to six applications of the spray (every five days), which necessitates the casting of the animals from the series. Accordingly on Schedule 15 it will be noticed that the arsenite of soda is reduced to three-quarters of the above quantity: only 12 ozs. to 20 galls. of other fluid being used. This appears efficacious and safe, and after twelve sprayings an attempt is made to reduce the interval to two clear days instead of four, which is continued at this reduced interval for three sprayings, when symptoms of slight skin trouble necessitate return to the four clear days' interval, which is repeated with safety up to 23 operations before being discontinued as final. This experiment is repeated under letter "B" (Schedule 15) at a constant interval of four clear days with practically the same result up to 19 sprayings, covering a period from 28th August to 26th November. A recapitulation under letter "C" gives the same results up to 10 sprayings.

As will be seen from inspection of Schedule 15, a spraying fluid composed of the above constituents and containing in every 20 gallons 12 ounces of arsenite is both efficient and safe for use as a *spraying-fluid* for an indefinite period.

An attempt was made to further reduce this amount of arsenite, keeping the other proportions as before, but the results were not so uniform although the cattle in the series were maintained practically free from ticks. (This schedule has not, from considerations of space, been put up.)

In view of the above results an endeavour was made to simplify the composition of the dip by omitting both the paraffin and glycerine, the soap emulsion remaining as before. Schedule 16 shows that the effect of the arsenic was too irritant even in the three-quarter strength, and that the animals had to be cast after the application of three sprayings. The addition of the glycerine to the composition used in Schedule 16 gives much the same result (as Schedule 17 shows), whereas the addition of the paraffin and the omission of the glycerine (Schedule 18) permits of the application of 11 sprayings before it is necessary to cast the animals. These results may, therefore, be summarised as follows:—

Arsenite (alone) 12 ounces to 20 gals. permits	...	3 sprayings
Arsenite, Soap emulsion „ „	...	3 sprayings
Arsenite, Soap and Glycerine „ „	...	3 sprayings
Arsenite, Soap and Paraffin „ „	...	11 sprayings
Arsenite, Soap, Glycerine and Paraffin „ „	...	23 sprayings

Arsenite of soda, therefore, in proportions as shown combined with the materials given above is a safe and efficient agent for use as a spraying fluid repeated at intervals of four clear days.

An endeavour was then made to observe the effects of the above fluid in the form of a dip in which cattle could be completely submerged, and accordingly a dip of the ordinary pattern (about 3,000 gallons capacity) was filled with the composition as above, with the exception of the glycerine. (See Appendix A.) Through this dip eight beasts were passed, as shown in Schedule 19, from which it will be seen they rapidly became unfit for further experiment.

As it was thought that this disappointing result might possibly have been due to the presence of un-emulsified paraffin which floated upon the top of the tank this oil was removed by skimming and water was added to the dip in order to bring the strength down to one pound of arsenite to forty gallons of fluid. The effect of this mixture is shown on Schedule 20, and eight beasts were passed through this fluid for four dippings before signs of skin-irritation began to manifest themselves. This difference of behaviour in the dipping fluid—even when less arsenite was present—seems strange, and I am not able to offer any satisfactory

explanation of the fact, which, however, has been noted by other observers.

A further dilution of the whole dip was therefore decided upon, and sufficient water was added to bring the strength down to one pound of arsenite to forty-six gallons, and the results of this final adjustment are seen in Schedule 21. It will there be seen that 40 beasts have been passed through this solution without any sign of skin irritation and that they have been cleaned from their ticks and maintained in a condition of comparative freedom from tick-infestation. During this period—dating from 21st December to the end of February—they have been continuously exposed to such re-infestation by ticks as the somewhat denuded paddocks have afforded, and such ticks as have attached themselves to the cattle have been regularly destroyed. Numerous Brown ticks have existed during this time, and separate experiments have been made upon the ears by bagging, etc., in order to observe the effect of the immersion upon these ticks in particular: the question of survival after dipping being in this way differentiated from re-infestation.

The strength of the dipping fluid has been ascertained from time to time, both by estimation of the quantity of arsenic by analysis, and by the cleansing effect produced upon the small number of grossly-infested beasts kept apart from the general herd.

It will, therefore, be seen that the fluid which, for want of a better term, I have called the "Laboratory Dip," is capable of continued application at intervals of four clear days for an indefinite period, and that it has proved as far as could be judged an efficient tick-killing preparation.

As I have said before, however, the work has been conducted with several limitations which may possibly give rise to results somewhat divergent from the foregoing results when an extended use of the dip in various localities is made. Simple adjustment of detail without alteration of any important point will, however, suffice in any such cases to ensure good results.

Another point upon which further observation is desirable is the safety with which working cattle subjected to this dip can be used for draught purposes. This point can be decided only by further trials which I am now arranging to have carried out in different parts of the Province. It appears to me, however, that there is good reason to believe that cattle can be worked with impunity while undergoing regular dipping, and I trust it may be found that the work undertaken in this direction will prove not only of use in retarding the spread of East Coast Fever but will prove of assistance in the general eradication of the tick itself.

II. WATKINS-PITCHFORD,

Govt. Bacteriologist.

The following are the schedules referred to in the foregoing report:—

Schedule No. 1.

COOPER'S "TIXOL."

FULL STRENGTH.

(As directed to be used by the
Manufacturers)

First spraying, June 13th, 1908.—Both beasts moderately infested with ticks.

Second spraying, June 18th.—(1) 30 adults, also many young alive; (2) few young ticks present.

Third spraying, June 23rd.—No adult, large number of young dead.

Fourth spraying, June 28th.—Clean.

Fifth spraying, July 3rd.—(1) Few small ticks in ears, beasts purging; (2) clean, skin cracked.

Sixth spraying, July 8th.—(1) Accidental death; (2) clean, skin cracked.

Seventh spraying, July 13th.—(2) Few young ticks, badly cracked. Cast.

THREE-QUARTER STRENGTH.

First spraying, June 14th.—Moderately infested.

Second spraying, June 19th.—Two adult forms alive, also few young.

Third spraying, June 24th.—(1) Few small forms present, belly swollen; (2) clean.

Fourth spraying, June 29th.—(1)

THREE-QUARTER STRENGTH.—

Continued.

Clean, grinding teeth; (2) clean, legs peeling.

Fifth spraying, July 4th.—(1) Clean, stiff hind legs; (2) clean, legs cracked.

Sixth spraying, July 9th.—(1) Stiff and lame, cast; (2) badly cracked, cast.

HALF STRENGTH.

First spraying, June 15th.—Moderately infested with ticks.

Second spraying, June 20th.—(1) Several adult, also young ticks alive; (2) few fresh crawling forms young ticks.

Third spraying, June 25th.—(1) Many adult and young ticks present; (2) practically clean.

Fourth spraying, June 30th.—(1) Few adult and young alive, many dead; (2) practically clean.

Fifth spraying, July 5th.—(1) Practically clean; (2) clean.

Sixth spraying, July 10th.—(1) Clean, slightly cracked; (2) clean.

Seventh spraying, July 15th.—Cracked and peeling, cast. Died on July 13th from the effects of spraying.

SUMMARY.

It is evident from the above schedule that this preparation is too severe in its effects when used every fifth day in its full strength. The effects begin to be pronounced after the application of the fourth spraying, and when the strength of the spray is reduced by one-quarter no great difference is observed. Even when used at half strength directed effects begin to be produced on the skin after the fourth spraying. It is obvious, therefore, that this preparation—while quite efficient as a tick-destroyer—is not capable of use even when diluted to half strength. The directions upon the tin state that this preparation should not be used in the strength directed more often than once in 14 days, and the three-quarter and half-strength tests show that it is not capable of repetition at short intervals even at the much reduced strengths shown above.

Schedule No. 2.

McDOUGALL'S DIP.

FULL STRENGTH.

(As directed to be used by the Manufacturers.)

First spraying, June 13th, 1908.—Moderately infested with ticks.

Second spraying, June 18th, 1908.—Several adult, also large number young ticks.

Third spraying, June 23rd, 1908.—(1) 9 adult and many young ticks alive; (2) 13 adult and many young ticks alive.

Fourth spraying, June 28th, 1908.—Practically clean; (2) 14 adult and many young ticks alive.

Fifth spraying, July 3rd, 1908.—(1) 5 adult and large number young ticks; (2) 20 adult and large number young ticks.

Sixth spraying, July 8th, 1908.—(1) 3 adult alive, practically clean; (2) 15 adult and many young ticks alive.

July 8th, 1908.—Infested by hand on body, ears, etc.

Seventh spraying, July 13th, 1908.—(1) 4 adult and few young ticks present; (2) 3 adult and many young ticks alive.

THREE-QUARTER STRENGTH.

First spraying, June 14th, 1908.—Many adult and young ticks present.

THREE-QUARTER STRENGTH.—

Continued.

Second spraying, June 19th, 1908.—(1) 10 adult and large number young ticks; (2) 30 adult and large number young ticks.

Third spraying, June 24th, 1908.—(1) 150 adult and large number young ticks; (2) 80 adult and large number young ticks.

Fourth spraying, June 29th, 1908.—(1) 80 adult and large number young ticks; (2) 50 adult and large number young ticks.

Fifth spraying, July 4th, 1908.—(1) 30 adult and large number young ticks; (2) 10 adult and large number young ticks.

Sixth spraying, July 9th, 1908.—(1) 10 adult and large number young ticks; (2) 12 adult and few young ticks present.

Seventh spraying, July 14th, 1908.—(1) 40 adult and large number young ticks; (2) 30 adult and large number young ticks.

HALF STRENGTH.

First to seventh spraying, from June 15th to July 15th, 1908. In this dilution no appreciable effect upon the tick seemed to be exerted.

SUMMARY.

It will be observed from the above table that this dip has been found capable of answering to the requirements of application every fifth day, without producing any skin trouble or constitutional derangement. It will be noted, however, that its tick-killing properties are not well marked and that many adult ticks appear to survive the reapplication of the fluid.

It is probable that the use of this dip in greater strength than that recommended by the manufacturers would give a greater efficiency as regards tick destruction, but whether such stronger solution could be applied every fifth day without producing any derangement is conjectural, the pressure of time and the number of other necessary observations prevented the ascertaining of this point.

Schedule No. 3.

QUIBELL'S PASTE DIP.

FULL STRENGTH.

(As directed to be used by the
Manufacturers.)

First spraying, June 13th.—Large number adult and young ticks.

Second spraying, June 18th.—Majority adult and few young forms dead.

Fourth spraying, June 23rd to July 3rd.—Practically clean.

Sixth spraying, July 8th.—(1) Clean, skin cracked slightly; (2) clean.

Eighth spraying, July 13th to July 23rd.—Reinfection with large number young ticks.

Tenth to seventeenth spraying, July 28th to September 1st.—Practically clean.

Eighteenth to twenty-first spraying, September 6th to September 21st.—Practically clean, with occasional slight reinfestation. A few brown ticks appeared to survive.

Twenty-second to twenty-fifth spraying, September 26th to October 11th.—Practically clean, with occasional slight reinfestation. A few brown ticks appeared to survive.

THREE-QUARTER STRENGTH.

First spraying, June 14th.—Moderately infested.

Second spraying, June 19th.—(1) Large number young ticks present; (2) many young ticks dead and many present.

Third spraying, June 24th.—Practically clean.

Fourth to eighth spraying, June 29th to July 19th.—Practically clean.

Ninth to nineteenth spraying, July 24th to September 12th.—Clean.

Twenty-first to twenty-fifth spraying, September 17th to October 12th.—(1) Clean; (2) few brown ticks persisting.

HALF STRENGTH.

First to twenty-fifth spraying, June 15th to October 13th.—Throughout this period, from June 15th to October 13th, these beasts remained fairly clean, the spray destroying the majority of forms of the blue tick. A few, however, seemed to be resistant and appeared to mature; many brown ticks remained unaffected by the solution in this strength.

August 2nd, salivating; August 4th, died.

SUMMARY.

As will be seen from the above table, this preparation was capable of repeated (25) applications at intervals of four clear days in three-quarter and half strengths. In full strengths it approached nearly to the desired result, but a certain amount of skin irritation was noticed after the fourth or fifth spraying, whilst the constant reapplication proved fatal to one beast after ten sprayings. The other animal of the series survived to the twenty-fifth time of spraying, when observations were discontinued. While, therefore, this dip is too strong for repeated use in its full strength it permits many ticks to survive when used in three-quarter strength, and it is possible that an adjustment between these two dilutions might give satisfactory results. It is understood that the above results have not taken into consideration the question of the safety of working animals after application of the dip, and more than one instance has been brought to my notice of unfortunate results occurring in the case of working oxen after having been dipped at intervals of seven days. The safety, therefore, of a dip for repeated application does not imply necessarily its safety for general use in the case of working animals.

Schedule No. 4.

COOPER'S POWDER.

FULL STRENGTH.

(As directed to be used by the
Manufacturers.)

First spraying, June 13th, 1908.—Moderately infested.

Second spraying, June 18th.—Five adult and small number young ticks.

Third spraying, June 23rd.—Young Ticks all dead, practically clean.

Fifth and sixth spraying, June 28th to July 8th.—Clean; (1) skin peeling.

Seventh spraying, July 13th.—(1) Clean, badly cracked, cast; (2) clean badly cracked, cast.

THREE-QUARTER STRENGTH.

First spraying, June 14th, 1908.—Moderately infested.

Second spraying, June 19th.—(1) Few young ticks; (2) 18 adult and few young ticks.

Third spraying, June 24th.—(1) Practically clean; (2) 25 adult live, many adult dead.

THREE-QUARTER STRENGTH. —

Continued.

Fourth spraying, June 29th.—Clean.

Fifth spraying, July 4th.—Clean.

Sixth spraying, July 9th.—Clean.

Seventh spraying, July 14th.—(1) Skin cracked, cast; (2) skin cracked, cast, lachrymation.

HALF STRENGTH.

First spraying, June 15th, 1908.—Moderately infested.

Second spraying, June 20th.—(1) Adult dead, large number young ticks; (2) 17 adult, large number young ticks.

Third spraying, June 25th.—(1) Adult dead, large number young alive; (2) body clean, large number young alive.

Fourth spraying, June 30th.—Clean.

Fifth spraying, July 5th.—Clean.

Sixth spraying, July 10th.—Small number young ticks.

Seventh spraying, July 15th.—Clean, skin roughened, cast.

SUMMARY.

The above table shows that this preparation is not capable of satisfying the demands of the enquiry in hand, inasmuch as the skin commences to be affected after the fourth spraying at ordinary strength, while when reduced to half strength only seven sprayings are tolerated before skin irritation is set up. It is probable, therefore, that in a form of a dip rather than as a spray the skin of these animals would have become affected at an even shorter interval.

This preparation appears to be highly efficient as a tick destroyer, but the interval at which it could be applied safely is probably a somewhat lengthy one.

Schedule No. 5.

DEMUTH DIP.

FULL STRENGTH.

(As directed to be used by the
Manufacturers.)

First spraying, July 8th, 1908.—Moderately infested.

Second spraying, July 13th.—(1) Large number young ticks; (2) small number young ticks.

Third spraying, July 18th.—Majority of ticks dead.

Fourth spraying, July 23rd.—Practically clean, legs peeling.

Fifth spraying, July 28th.—Clean, skin cracked, cast.

THREE-QUARTER STRENGTH.

First spraying, July 9th.—(1) Fair number of ticks present; (2) large number of ticks of all ages.

Second spraying, July 4th.—(1) Few young ticks; (2) 12 adult alive; majority of ticks dead.

Third spraying, July 19th.—Clean, badly cracked, cast.

HALF STRENGTH.

First spraying, July 10th.—Moderately infested.

Second spraying, July 15th.—Practically clean.

Third spraying, July 20th.—Clean.

Fourth spraying, July 25th.—Re-infested with moderate number of ticks.

Fifth spraying, July 30th.—(1) Clean, skin cracked, cast; (2) clean.

Sixth spraying, August 4th.—(2) Clean.

Seventh to tenth spraying, August 9th to August 24th.—(2) Re-infested large number of young ticks.

Eleventh to twelfth spraying, August 29th to September 3rd.—Large number of adults present.

Thirteenth to sixteenth spraying, September 8th to September 23rd.—Practically clean.

SUMMARY.

It will be seen from the above that this dip is not able to withstand repeated application. It will be noticed that the skin commences to become affected after three sprayings at full strength, and even in three-quarter strength this dip is not tolerated any better. Reference to the schedule will show that at the dilution recommended by the proprietors the legs became affected when the beasts were brought up for their fourth spraying, and it became necessary to cast them from the series after the fourth spraying.

The same results attended the use of the three-quarter strength solution, while in half strength it was found necessary to cast one beast at the fourth spraying, although the companionesse No. 2, as will be seen, goes on to the sixteenth spraying, having apparently acquired a considerable degree of tolerance.

This dip—though an excellent tick-killer—is obviously unsuited for repeated application.

Schedule No. 6.

IZO-IZAL SHEEP DIP.

FULL STRENGTH.

*(As directed to be used by the
Manufacturers.)*First spraying, October 2nd, 1908.—
Moderately infested.Second spraying, October 7th.—Moder-
ately infested, none dead.Third spraying, October 12th.—Moder-
ately infested, none dead.Fourth spraying, October 17th.—Mod-
erately infested, none dead.Fifth spraying, October 22nd.—Moder-
ately infested, none dead.Sixth spraying, October 27th.—Moder-
ately infested, none dead.Seventh spraying, November 1st.—
Large number larval and nymphal
forms.

THREE-QUARTER STRENGTH.

First spraying, October 2nd, 1908.—
Moderately infested.Second spraying, October 7th.—Mod-
erately infested, none dead.Third spraying, October 12th. Mod-
erately infested, none dead.Fourth spraying, October 17th.—Mod-
erately infested, none dead.Fifth spraying, October 22nd. Moder-
ately infested, none dead.Sixth spraying, October 27th.—Large
number of young ticks present.Seventh spraying, November 1st.—
Large number adult and young ticks.

SUMMARY.

As will be seen from the above schedule, this preparation fails to destroy ticks upon cattle when used in the dilution as suggested by the manufacturers, 1 part to 100 parts of water. No irritating effects were observed after seven sprayings, when, as the tick-killing property of the dip seemed to be insufficient, the observations were discontinued.

Schedule No. 7.

THOMAS'S DIP.

FULL STRENGTH.

*(As directed to be used by the
Manufacturers.)*First spraying, September 28th, 1908.
—Fair number of adult ticks.

Second spraying, October 3rd.—Clean.

Third spraying, October 8th.—Clean.

Fourth spraying, October 13th.—
Clean, skin cracked, cast.

THREE-QUARTER STRENGTH.

First spraying, September 28th, 1908.
—Fairly infested.Second spraying, October 3rd.—Prac-
tically clean.

Third spraying, October 8th.—Clean.

Fourth spraying, October 13th.—
Clean.Fifth spraying, October 18th.—Clean,
skin cracked, cast.

SUMMARY

The above schedule clearly shows the unsuitability of this preparation for repeated use at short intervals. Its tick-killing properties are, however, obvious.

*Schedule No. 8.***HOLMES' DIP.****FULL STRENGTH.***(As directed to be used by the
Manufacturers.)*

First spraying, February 8th, 1909.—
Moderately infested with brown ticks.
Second spraying, February 13th.—
Many dead brown ticks, reinfested large

number brown ticks.

Third spraying, February 18th.—Ma-
jority brown forms dead.Fourth spraying, February 23rd.—
Clean.Fifth spraying, February 28th.—
Clean.**SUMMARY.**

Owing to this preparation not coming under review until such time as observations upon other dips were almost complete it has not been found possible to give it the same extensive trial as that given to other preparations. It will be seen, however, from the short schedule above that this preparation appears to be efficient as regards its tick-killing property and capable of repetition for at least five sprayings; though it should be stated in this latter connection that the only cattle available for this test have been repeatedly dipped in Laboratory Dip, and may on this account have possessed a certain amount of tolerance to further skin-applications containing arsenic. Its efficacy as a tick-destroyer appears to be well established.

*Schedule No. 9.***"LALINE SHEEP DIP."****FULL STRENGTH.***(As directed.)*

First spraying, January 25th, 1909.—
Numerous adult and young ticks present.

Second spraying, January 30th, 1909.—
Numerous adult and young ticks present; none dead.

Third spraying, February 4th, 1909.—
Numerous adult and young ticks present; none dead.

THREEQUARTER STRENGTH.

First spraying, January 25th, 1909.—
Large number of adult and young ticks present.

Second spraying, January 30th, 1909.—
Large number of adult and young ticks present, none dead.

Third spraying, February 4th, 1909.—
Large number of adult and young ticks present, none dead.

SUMMARY.

This preparation did not appear to exert any poisonous influence upon the ticks when used at the strength recommended as no dead ticks were observed, and as the test cattle remained thickly infested after three sprayings, observations on this dip were discontinued.

Schedule No. 10.

HYPO-CHLORITE OR ELECTROLYSED SEA WATER.

FULL STRENGTH.

First spraying, January 25th, 1909.—
Moderate number of ticks present.

Second spraying, January 30th, 1909.
—Large number of adults present, none dead.

Third spraying, February 4th, 1909.—
Large number of adults present, none dead.

THREE-QUARTER STRENGTH.

First spraying, January 25th, 1909.—
Large number of adult forms present.

Second spraying, January 30th, 1909.
—Large number of adult forms present, none dead.

Third spraying, February 4th, 1909.—
Large number of adult forms present, none dead.

SUMMARY.

This preparation proved, as will be seen from the above schedule, to be apparently unable to kill any ticks when used in the proportions directed, *viz.*, 1 part to 49 parts of water. The observations were discontinued after the third spraying.

Schedule No 11.

ARSENITE OF SODA.

1 lb. to 20 gallons.

FULL STRENGTH.

First spraying, July 3rd, 1908.—
Beasts moderately infested.

Second spraying, July 8th, 1908.—(1)
No adult live, large number young alive; (2) seven adult dead and adhering, few young alive.

Third spraying, July 13th, 1909.—
Practically clean.

Fourth and fifth spraying, July 18th and 23rd.—Practically clean, skin cracked, cast.

THREE-QUARTER STRENGTH.

First spraying, July 4th, 1908.—Mod-
erately infested.

Second spraying, July 9th, 1908.—
Practically clean.

Third spraying, July 14th, 1908.—
Practically clean.

Fourth spraying, July 19th, 1908.—
Clean, skin cracked, cast.

HALF STRENGTH.

First spraying, July 15th, 1908.—Mod-
erately infested.

Second spraying, July 10th, 1908.—
Practically clean, many lice present.

Third spraying, July 15th, 1908.—
Practically clean, many lice present, lice still alive.

Fourth spraying, July 25th, 1908.—
(1) Clean, legs cracked, cast; (2) clean.

Sixth spraying, July 30th, 1908.—(2)
Clean.

Seventh spraying, August 4th.—(2)
Skin cracked, cast.

SUMMARY.

Inspection of the above schedule shows that this preparation is too irritant when used in the strength often prescribed, *viz.*, one pound to

20 gallons of water. As will be seen, the skin commences to become affected after the third spraying at full strength, while when used in the proportion of only one half-pound to 20 gallons, one of the test animals was cast after the fourth spraying and the remaining one after the sixth spraying.

This schedule is of interest as showing the influence of the arsenite of soda used alone in an un-combined state. Comparison between this table and Schedules Nos. 14 and 15 of "Laboratory Dip" will show the result of combining other agents with this arsenite of soda, which result in the reduction of its irritating properties without taking away from its efficacy as a tick-killer.

It is obvious that arsenite of soda by itself is not suitable either in the form of a spray or a dip, if application at short intervals is to be practised.

Schedule No. 12.

ERKENBRACH'S CATTLE DIP.

(All the observations below are made upon "Full Strength.")

FIRST OBSERVATIONS.

First spraying, June 15th, 1908.—Cattle well infested.

Second spraying, June 20th.—Moderately infested.

Third spraying, June 25th.—(1) Practically clean, coughing; (2) practically clean; trembling, sick.

Fourth spraying, June 30th.—(1) Clean, coughing; (2) clean, legs peeling.

Fifth spraying, June 5th.—(1) Clean, legs peeling; (2) clean, skin cracked, cast.

Sixth spraying, July 10th.—(1) Clean, badly cracked, cast.

SECOND OBSERVATIONS.

First spraying, January 25th, 1909.—Moderately infested.

Second spraying, January 30th.—Moderately infested; many dead.

Third spraying, February 4th.—Moderately infested; skin peeling, cast.

THIRD OBSERVATIONS.

Four Beasts.

First spraying, February 15th, 1909.—All beasts moderately infested with ticks.

Second spraying, February 20th.—Clean.

Third spraying, February 25th.—Nos. 1 and 2 clean; skin cracked, cast. Nos. 3 and 4 clean.

Fourth spraying, March 2nd.—No. 2 clean; skin peeling, cast.

SUMMARY.

The above schedule shows the repeated effect of spraying at intervals of five days. It will be observed that three separate observations have been attempted in the months of June, January and February, and in each case the result will be found the same, with the exception that the spraying fluid is apparently tolerated better during the dry weather. The results in every case have been severe, and in a number of cases not shown in the schedule in which the proprietor's instructions were

misunderstood, a slight increase in the strength of the spraying solution resulted in the deaths of several animals after the fourth or fifth spraying. Responsibility for this result, of course, does not rest with the dip itself, but it serves to show the result which may be brought about if this preparation is used in greater strength than that recommended.

It will be noticed that three-quarter strengths or half-strengths are not shown in the above schedule, which is due to above mistake, which, unfortunately, tended to confuse the results. Such results, therefore, have not been included in the schedule.

Judging from the behaviour of this preparation (in its full or manufacturers' strength) and also in its dilutions in comparisons with other preparations of a somewhat arsenical content, I am of the opinion that this dip would be found too severe in its three-quarter strength, and it is doubtful whether repeated dippings in half-strength would be tolerated.

Its efficacy as a tick-killer is undoubted.

Schedule No. 13.

ALDERSON'S CATTLE DIP.

This preparation appears to be somewhat similar to Erkenbrach's dip, while the arsenical content appears to be much the same. The remarks, therefore, in Schedule No. 12 apply equally to this preparation.

Six head of cattle were used for this test, as in other instances.

Schedule No. 14.

"LABORATORY" SPRAYING FLUID.

(Containing Arsenite of Soda, Glycerine, Paraffin and Soap.)

FULL STRENGTH.

(1lb. As. o to 20 gals. Water.)

First spraying, August 3rd, 1908.—Cattle moderately infested.

Second to fourth spraying, 8th to 18th August, 1908.—Practically clean.

Fifth spraying, August 23rd.—(1) Clean, skin rough; (2) clean, skin cracked, cast.

Sixth spraying, August 28th.—(1) Clean, skin cracked, cast.

SECOND TEST, FULL STRENGTH.

First spraying, September 11th.—Beasts well infested.

Second spraying, September 16th.—Practically clean.

Third to fifth spraying, September 21st to October 1st.—Clean.

Sixth to eighth spraying, October 6th to 16th.—Clean, skin peeling.

Ninth spraying, October 21st. Clean, skin cracked, cast.

*Schedule No. 15.***"LABORATORY" SPRAYING FLUID.****(A.)**

First spraying, August 3rd, 1908.—Beasts moderately infested.

Second spraying, August 8th.—Beasts moderately infested.

Third to sixth spraying, August 13th to 28th.—Practically clean.

Seventh to eighth spraying, September 2nd to 7th.—Clean.

Ninth to thirteenth spraying, September 12th to 30th.—Slight reinfestation, cleaned by each recurring application of the spraying fluid.

Fourteenth spraying, October 3rd.—Clean.

Fifteenth to sixteenth spraying, October 6th to 11th.—Clean, skin peeling.

Seventeenth spraying, October 16th.—Clean, skin improving.

Eighteenth spraying, October 21st.—Clean, skin normal.

Nineteenth to twenty-third spraying, October 26th to November 5th.—Clean, skin normal.

(B.)

First spraying, August 28th, 1908.—Beasts moderately infested.

Second to fourth spraying, September 21st.—Approximately half ticks present dead.

Fifth spraying, September 17th.—Clean.

Sixth to nineteenth spraying, September 22nd to November 26th.—Clean.

(C.)

(Third test of the three-quarter strength.)

First spraying, October 12th.—Moderately infested.

Second to tenth spraying, October 17th to November 26th.—Clean.

*Schedule No. 16.***"LABORATORY" SPRAYING FLUID.**

(Containing Arsenite of Soda and Soap Solution Only.)

FULL STRENGTH.

(1½ lb. Ar. So. to 20 gals. Water.)

Moderately infested.

Second spraying, October 7th.—Three adult dead adhering.

Third spraying, October 12th.—Few brown ticks, skin cracking.

Fourth spraying, October 17th.—Clean, skin cracked, cast.

THREE-QUARTER STRENGTH.

First spraying, October 2nd.—Moderately infested.

Second spraying, October 7th.—Skin practically clean.

Third spraying, October 12th.—Clean, skin peeling.

Fourth spraying, October 17th.—Skin cracked, cast.

*Schedule No. 17.***"LABORATORY" SPRAYING FLUID.**

(Containing Arsenite of Soda, Glycerine and Soap.)

FULL STRENGTH.

First spraying, October 2nd.—Moderately infested.

Second spraying, October 7th.—Clean.

Third spraying, October 12th.—Clean, skin peeling.

Fourth spraying, October 17th.—Clean, skin cracked, cast.

THREE-QUARTER STRENGTH.

First spraying, October 2nd.—Slightly infested with ticks.

Second and third spraying, October 7th and 12th.—Clean.

Fourth spraying, October 17th.—Skin badly cracked, cast. (Died on the 18th of October.)

*Schedule No. 18.***"LABORATORY" SPRAYING FLUID.***(Containing Arsenite of Soda, Paraffin and Soap.)*

THREE-QUARTER STRENGTH (ONLY).	Re-infested with many brown ticks; (2) clean.
First spraying, October 28th.—Well infested with ticks.	Seventh spraying, November 27th.— (1) Clean; (2) clean.
Second spraying, November 2nd.— Practically clean.	Eighth to tenth spraying, December 2nd to 12th.—Clean.
Third to fifth spraying, November 7th to 17th.—Clean.	Eleventh spraying, December 17th.— Clean, skin peeling.
Sixth spraying, November 22nd.— (1)	Twelfth spraying, December 22nd.— Skin cracked, cast.

*Schedule No. 19.***"LABORATORY" DIPPING FLUID.***(Containing Arsenite of Soda, Paraffin and Soap; 2,000 gallons; the proportion of Arsenite being 1 lb. to 33 gallons.)*

First dipping, November 22nd, 1908. —Eight beasts, all well infested.	Third dipping, December 22nd, 1908.— Skin cracking, cast.
Second dipping, November 27th, 1908. —Clean.	Compare this result with that ob- tained by similar fluid used as spray.

*Schedule No. 20.***"LABORATORY" DIPPING FLUID.***(Composition as above with 400 gallons Water added.)*

First dipping, December 3rd, 1908.— Beasts (8) moderately infested.	Fourth dipping, December 13th, 1908. —Clean.
Second dipping, December 8th, 1908.— Clean.	Fifth dipping, December 23rd, 1908.— Five beasts cast for skin irritation; the remaining three were turned out.
Third dipping, December 13th, 1908.— Clean.	

*Schedule No. 21.***"LABORATORY" DIPPING FLUID.***(Composition as above with a further 400 gallons Water.)*

First dipping, December 21st, 1908.— Beasts (8) well infested.	Sixth dipping of original eight, Jan- uary 15th.—Clean.
Second dipping, December 26th, 1908. —Practically clean.	Seventh dipping of original eight, January 20th.—Clean; remainder showed ticks dead to about 50 per cent.
Third dipping, December 31st, 1908.— Re-infested with small and brown ticks.	Eighth dipping of original eight, Jan- uary 25th.—Clean.
Fourth dipping, January 5th, 1909.— Many dead forms attached, and some fresh re-infestation.	Ninth dipping on January 30th to fifteenth dipping on March 1st.—This herd has remained practically clean. Slight re-infestation has been observed on several occasions, but the cattle have remained tick-free during the last five or six dippings.
Fifth dipping, January 10th, 1909.— Clean.	
At this point thirty-one head of cattle were added to the test; all beasts well infested.	

APPENDIX (A).

LABORATORY DIPPING AND SPRAYING FLUID.

To mix 400 gallons:—

Eight pounds Arsenite of Soda.*

Five and a half pounds Soft Soap.

Two gallons Paraffin.

The details for preparation are as follows:—Dissolve the soap in about 5 gallons of hot water; while still hot add this soap solution in small quantities at a time to the paraffin and beat or stir to a creamy lather. This makes the soap emulsion. Dissolve eight pounds of arsenite of soda in a sufficient quantity (about a gallon) of hot water, and when completely dissolved add cold water up to 50 gallons. This mixture can be made in the tank. The soap solution may then be gradually added, stirring thoroughly the while.

Water should then be added till the 400 gal. tank is full. When it is desired to fill the dipping tank the above procedure can be adopted for as many times as is found necessary, or one mixing may be made sufficient for the purpose. Four hundred gallons, however, is a sufficient quantity to handle at one time. If a film of oil floats to the top of the dip in the tank the dip should be stirred with a stick, or board, before commencing to dip, or the oil may easily be removed by skimming, the proportion of alkali present in the soft soap (a proportion varying with different samples) determining to some extent the degree of emulsification of the oil.

It is of great importance that arsenite of soda containing 80 per cent. arsenic should be used, as it has been found in the past that several failures have been experienced in the application of this dip by the use of unreliable arsenical preparations. Hard water should not be used in the mixing of the dip. The above instructions should be strictly adhered to when mixing.

In the case of cattle not habituated to an arsenical dip, slight excoriation of the skin of the thighs and neck, etc., may be produced after the first dippings, but should this difficulty arise a dressing of the affected parts with oil or lard before dipping will permit of the animals being dipped at the five-day interval. It will be found that this intolerance rapidly disappears.

The approximate cost of the preparation for 400 gallons, at the wholesale rate as ascertained from a leading Maritzburg merchant, is as follows:—

Soft Soap, 5½ lbs., say at 4d.	1	10
Paraffin, 2 gallons, say at	2	2
Arsenite of Soda, 8 lbs., say at 5d.	3	4

7 4

*Arsenate of Soda, which is a different chemical compound, shall not be used.

APPENDIX (B).

COMPOSITION OF DIP

USED ONCE IN EVERY SEVEN DAYS ON NEL'S RUST ESTATE.

(By courtesy of G. D. Alexander, Esq.)

Composition of dipping fluid:—

5 lbs. arsenic;
15 lb. soda;
2 gallons of tar;
24 lbs. soap (soft);
400 gallons water.

The above is mixed in the usual way and cows and working oxen are dipped with impunity. It will be noticed that the arsenic itself instead of arsenite of soda is used and that the soda upon which the solubility of the arsenic depends is given as a separate item, the result being the same. The total quantity of arsenic present is, however, smaller in this dip than in the "Laboratory Dip," while the quantity of soap is considerably increased.

This dip has not been tried oftener than once a week as far as I am aware, but I see no reason why it should not safely be applied at less intervals than seven days.

PREPARATION FOR DRESSING EARS.

1 part "Ketrol" or "Cyllin";

9 parts grease (composed of 6 lbs. wagon oil and 3 lbs. lard oil).

This is applied with a swab to cattle while standing in the yoke or upon emerging from the dip in order to reinforce the action of the dip, and to ensure the destruction of all ticks present. It is probable that the low arsenical percentage contained in this dip makes this procedure advisable. It is, however, one which ensures the cleanliness of the ears of beasts and appears to be a useful procedure where the absolute cleansing of the cattle from ticks is desired.

APPENDIX (C).

OBSERVATIONS OF SPRAYING APPLIANCES, DEVISED BY
LT.-COL. WATKINS-PITCHFORD.

The difference of opinion which has so long existed between the advocates of "dipping" *versus* "spraying" as systems for the cleansing of animals from ticks and other parasites will be familiar to every dweller in South Africa. Close examination of these rival systems will show that each can claim its own advantages and must admit its own peculiar deficiencies and drawbacks. Hitherto the greatest of these drawbacks to the system of "spraying" has been the difficulty of ensuring the complete saturation of an animal without the expenditure of much time and trouble. Appliances for spraying have been primitive and slow, and in the past the time taken in completely spraying a single beast has sufficed to put a whole troop of cattle through a dipping trough. If this admittedly grave disadvantage were removed the great drawback to the system of spraying disappears, and this difficulty has now been overcome by the devising of a mechanical spraying machine capable of rapidly and thoroughly saturating any animal with any fluid.

The advantages of an efficient spraying apparatus are obvious. Complete saturation can be effected in a few seconds without hustling an animal off its feet into a deep tank and forcing it to swim out or drown. Owners of stock will see the advantage of the point when dealing with valuable or pregnant animals. The dipping fluid also which is used in the spray-pen is not subjected to deteriorating influences (such as take place through evaporation, access of storm water, etc., etc.), but remains at a constant strength by being mechanically strained and returned into a closed tank at the conclusion of every spraying operation. This constant quality of the spray-fluid is a point of no little importance, and much of the difficulty (such as failing to cleanse on the one hand, and poisoning effects on the other) experienced in the use of dipping tanks arises from the inability to prevent the causes of deterioration mentioned above.

The system of spraying with the appliance shown in the accompanying illustrations is briefly as follows:—The horse is harnessed into the usual horse-gear (which turns the mealie-sheller, bark-chopper, etc.), and the pump of the spray-pen is set in action. One or two revolutions of the horse suffice to thoroughly churn up the contents of the tank in which

the spraying fluid is stored. This thorough mixing of the fluid each time a spraying operation is undertaken is a point of much advantage. The tap of the storage tank is then allowed to run until the lower part of the floor of the pen is under water, so to speak (as by this means all animals leaving the pen and walking up the draining slope must pass through some three or four inches of the fluid, and thereby thoroughly wash the under surface of the feet and hoofs). This tap is then shut off, which action allows the pump to throw the fluid into a strongly-formed steel drum or chamber holding about 40 gallons, which is reinforced, or strengthened, by being buried in concrete. Here the fluid is compressed, and as it reaches a pressure of 60 lbs. to the inch a simple valve lifts and allows all further fluid to flow out into the floor of the pen.

A beast is then driven into the pen and the bars are closed behind it. In the improved pattern, a light iron gate, or grille, hinged at the top, and counterbalanced by a lever, is used to close the entrance and exit pen—instead of the bars, as shown—thereby saving time and trouble.

The levers shown in the illustration are then opened in turn, and held open for about five seconds each. These levers control a system of perforated pipes running along (*a*) the roof, (*b*) the sides, and (*c*) the floor of the pen, and from these different directions the fluid is alternately forced in a heavy spray at a pressure of 60 lbs., with the result that complete saturation of the beast rapidly ensues. The bars of the pen in front are then drawn, and the process is completed by the animal washing its feet as it walks up the draining slope, down which all fluid drips, finding its way back to the floor of the pen, from which it is drawn through a fine sieve, by the pump, and so is returned again to the spray pen. The horse meanwhile continues his round, and the pressure of 60 lbs. is ready again before another beast can be driven into the pen. When all animals have been sprayed, the tap is turned over, and the fluid is drawn from the floor of the pen, automatically strained, and thrown back into the storage tank for the next spraying operation.

The appliance is very simple. No gear exists to become easily deranged, nor can any blocking of the spray holes exist, as not only is all fluid strained before it reaches the pipes, but the ends of these pipes are all closed with easily-detached screw-caps which allow any possible obstruction to be rapidly removed.

In cases where a spray pen is erected for common use by several cattle-owners, each owner may, if he so desires, have his own storage tank, and so spray his herd with any particular brand of dipping fluid he favours, and of any strength his experience may dictate.

As very little excavation, if any, is necessary, the advantage where stony ground is encountered at the site selected is greatly in favour of the spray pen.

Many other points will occur which give the above system, in certain circumstances, great advantages over the old system of dipping, but as these remarks are intended as a brief description of the appliance itself, and not a treatise on Spraying v. Dipping, these points are left to the discernment of the reader.

The writer will be pleased to answer any questions which may be addressed to him with reference to the construction and approximate cost of an appliance as shown.

Learning Milking.

THE beginner should try upon "stale" cows; those about to be dried "off"; because a heavy milker might be entirely spoilt if carelessly milked by an amateur.

After the udder has been well wiped with a damp cloth, to remove all bits of dung or dirt, the milker should take a seat close up to the udder. The teats should be grasped firmly with the hands. The process of squeezing out the milk is not so easy as it looks, and requires a certain amount of skill. The hands should be moved alternately, one after the other, and the method of squeezing the milk downwards, by grasping the teat at the top, will be found to be a good one. The whole of the hand must be employed at each attempt, and success will follow—if you keep on or hold on long enough!

The learner should learn to milk crosswise and "otherwise," so that the udder will be emptied gradually, and *not* the two teats nearest until all the milk has been drawn, and lastly those behind. Milk clean; draw out the last drops, as this is the richest milk. Abundance of froth is a sign that a cow has been milked quickly.—GRACE YOUNG, in *Agricultural Gazette* (London).

STRANGLES IN HORSES.—Isolate the affected animals. Feed with mashes, and, if possible, green food. Give the horse a dessertspoonful each of powdered saltpetre and hyposulphite of soda in the drinking water three times daily. Rub the throat and between the jaws with stimulating liniment, *e.g.*, Elliman's embrocation. It is preferable to allow the abscess between the jaws to burst itself, but if it comes to a point the owner may lance it with a clean lance or knife. Afterwards allow free discharge, and keep clean with mild antiseptic wash. Horses should be kept in clean, healthy surroundings, and the premises should be thoroughly cleansed and disinfected.

Sugar Cane Culture.

EFFECTS OF SOLUBLE MANURES.

A BULLETIN (No. 39) has recently been issued by the Division of Agriculture and Chemistry of the Hawaiian Sugar Planters' Association, containing an account of work which has been taken up in order to gain a knowledge of the action of soluble manures on soils that are used for growing canes, and the following conclusions, arrived at by the author after twelve years' experience, are given:—

(1) The profit resulting from the application of fertilisers or manures will depend largely upon other factors than the chemical composition of the soil. Providing certain plant-food deficiencies represent the chief depressive influence on crop yields, the response to appropriate fertilisation will be commensurate with the difference between the limitations exerted upon crop production through lack of available plant nutrients and the limitations exercised by the next restraining factor in order of importance after the material has been applied. This latter factor may be physical, biological, or climatic in character.

(2) The relative effects of different combinations of fertiliser materials on the growth of sugar-cane when these materials are added to a given soil will be determined chiefly by:—

- (a) The extent to which their several ingredients directly or indirectly lessen the deficiencies of available plant nutrients;
- (b) The extent to which they cause the bacterial flora to approach an optimum balance for the regular production of sufficient nitrates or assimilable nitrogen compounds, and
- (c) The degrees and manner in which they produce physical changes in the soil.

(3) Owing to the fact that a definite relationship exists between the efficiency of a fertiliser mixture and the quantities and proportions in which its ingredients are associated, due to biological, chemical, and physical effects which its component parts have in a given soil, variations in the composition of the mixture beyond certain limits may materially influence crop yields.

(4) A more definite knowledge concerning the amounts and proportions of fertiliser salts to use in a mixture for best results would on some soils yield pronounced profits, while a lack of such knowledge may in some cases result in a loss, especially when soluble salts are employed.

(5) The greatest loss from the use of improper mixtures of fertilisers is apt to occur on acid soils, and in such cases considerable risk is involved from the continued application of mixtures containing ammonium sulphate, sulphate of potash, and acid phosphate, when lime dressings are not previously made.

(6) While the chemical and physical analysis of a soil will usually prove of value in indicating the best cultural methods to follow in maintaining or improving its fertility, and may also indicate in a general way certain of the plant food deficiencies in given cases, it cannot afford definite information as to the amounts or proportions of ingredients in fertiliser mixtures which will give maximum returns.

(7) It is possible that the data from more extended field experiments with a large variety of soils, when reviewed in connection with the comparative analysis of the soils, using both weak and strong acids as solvents, may indicate a somewhat definite relationship between the analytical figures and the order of importance which phosphoric acid and potash should assume in cane fertilisers in given cases.

(8) It would appear that analyses of soils, with more special reference to their physical qualities, reaction and content of organic matter, nitrogen, and more readily soluble lime, may, with due consideration of the water supply and climatic conditions, be relied upon to indicate such manurial treatment as will result in a profit, although they will not afford definite information as to the weights and proportions of the ingredients, in fertiliser mixtures which will result in maximum efficiency.

(9) Nitrogen is the most important element to be considered in the fertilisation of the sugar-cane in the Hawaiian Islands, and when applied in mixed fertilisers some risk of reduced efficiency is entailed if either the potash or phosphoric acid (in the form of soluble salts) is made to exceed the weight of this element.

(10) Unless through past local experience or carefully conducted field tests it has been definitely determined that a modified formula may be expected to give greater yields, it is safer, when applying nitrogen, potash and phosphoric acid in the form of soluble salts, to have the mixed fertiliser contain even quantities of these elements, which are not to exceed 60 lb. per acre in the case of each element.

(11) Field tests with fertilisers whose ingredients are mixed in varying proportions will, if such experiments are accurately and scientifically conducted through a sufficient period, give the most reliable information as to the best manurial practice. Such experiments should be laid out in very long, narrow, parallel, and continuous plots or strips, with the untreated control areas lying immediately adjacent to the fertilised cane.

(12) The great importation of "resting" fields in rotation on Hawaiian plantations, and growing upon them leguminous crops is very clearly indicated. This applies more particularly to the irrigated plantations, where the supplies of organic matter are, in the majority of cases, becoming greatly reduced through successive tillage operations in a comparatively arid climate, and by the favourable conditions created for bacterial activity through regular irrigations under uniformly high temperatures.

Utilisation of Waste Wattle Wood.

INTERESTING REPORTS FROM LONDON.

THE following report has been received by the Acting Secretary for Agriculture, Pretoria, from the Acting Trades Commissioner for South Africa in London, on the utilisation of waste wood paper pulp:—

At the request of the Secretaries of the Natal Agricultural Union certain samples of pulp made from the *Acacia molissimum* have recently been submitted to the Director of the Imperial Institute for examination and report with a view to ascertaining their industrial value.

The attached reports cannot be regarded as very encouraging, and do not alter the conclusions arrived at in 1899. A copy of extracts from the "Imperial Institute Technical Reports and Scientific Papers" is put up herewith.

It is thought, however, the matter is one demanding further and immediate investigation. It is becoming an imperative necessity to find an outlet for the increasing quantity of wattle wood in the form of a by-product of one kind or another, and the resolution passed at the last Conference of the Natal Agricultural Union:—

"That the Government should be asked to make experiments with black wattle wood for industrial purposes"

is one deserving the most consideration, not only of the Government but the growers themselves. It is suggested whether a sum of money might not be provided for the purpose of having experiments made with Black Wattle Wood in France, Germany, and Scandinavia, as well as in this country and South Africa. It seems somewhat strange, to the lay mind at least, that there should be no known process of converting the pulp into a marketable article, and perhaps additional experiments, on different lines, and in other countries, might produce satisfactory results.

ENCLOSURE No. I.

*Copy of Report by the Director of the Imperial Institute.
(4th March, 1910.)*

The samples of chemical wood pulp, which are the subject of this report, were forwarded to the Imperial Institute by the Commercial Agent for Natal with letter dated 20th December, 1909.

The samples were three in number, viz.:—

No. 1. Pale brown soft pulp. Weight, about 1 oz.

No. 2. Pale brown pulp, harder than No. 1. Weight, $\frac{1}{2}$ oz.

No. 3. Nearly colourless pulp, very soft and friable. Weight, 1-5th oz.

The ultimate fibres of the samples were found to have the following lengths:—

No. 1. From 0.016 to 0.052 inch, with an average of 0.034 inch.

No. 2. From 0.02 to 0.04 inch, with an average of 0.031 inch.

No. 3. From 0.012 to 0.064 inch, with an average of 0.036 inch.

The average length of the fibres in this wood pulp was thus only about one-thirtieth of an inch.

The extreme shortness of the ultimate fibres indicated that the pulp would have but little value for paper making.

This conclusion was confirmed by experts to whom the samples were submitted. A firm of wood pulp importers described them as far too soft and dirty, and said that, while sample No. 3 might be suitable for making blotting paper, the price would probably be too high.

A large firm of paper manufacturers stated that in their opinion the samples were totally unsuitable for paper making, as the shortness of the fibres would result in the production of a flabby and useless material.

It is thus evident that the wood from which these samples were prepared is unsuitable for the manufacture of paper-pulp.

It would be of interest if information would be furnished to the Imperial Institute as to the botanical source of the wood used in preparing the present specimens.

ENCLOSURE No. II.

*Copy of Report by the Director of the Imperial Institute.
(8th August, 1910.)*

I have to inform you that the samples forwarded have been submitted for valuation to a firm of paper-makers not hitherto consulted in the matter.

The firm report that the pulp is of a dark colour and is composed of very short fibres, and that if the material were used for paper-making it would have to be produced very cheaply, since, in order to find a market,

it would have to compete with a cheap raw material, made of waste products at the manufactories, which is equally good for paper-making and which can be bought at about £2 per ton in Manchester, Liverpool or London.

The manufacturers add that they endeavoured to bleach one of the samples, as the material would thereby be considerably increased in value, but found that a white product could not be obtained and that even to reduce the colour to a yellowish tint would be difficult and quite unremunerative.

Regarding the valuation of £3 15s. to £5 per ton, which is stated to have been placed on this pulp by Messrs. Pirie & Co., I beg to point out that ordinary unbleached chemical wood pulps are at present quoted at £5 10s. to £8 per ton, so that in any case the value of this wattle pulp is admittedly lower than that of the poorest quality of chemical pulp now on the market.

I note that the tree producing this pulp is *Acacia molissima*. I may point out that the question of the utilisation of the wood of this tree for the manufacture of paper-pulp has already been fully investigated at the Imperial Institute, and has formed the subject of two reports which were forwarded to the Agent-General for Natal on the 11th July, 1899, and the 23rd September, 1899, respectively, containing the results of technical trials by paper experts. These reports showed conclusively that the pulp produced from this *Acacia* wood would be of inferior quality and value, and that it was very doubtful if its manufacture in Natal would be remunerative.

ENCLOSURE No. III.

(Extract from the Imperial Institute Technical Reports and Scientific Papers, 1903.)

Suitability of the Wood of Acacia Molissima and Acacia Delbata for the Manufacture of Wood Pulp.

Experiments have been made on the suitability of these two trees for the manufacture of wood pulp with some of the eighty pieces of wood forwarded in May last by the Agent-General for Natal.

On referring the matter to our expert referees in wood pulp, they were of opinion that the wood should be tested by the sulphite process and also by the alkali process. A trial of both these woods by the sulphite process has now been carried out for us by a well-known manufacturer, who reports, however, that neither wood is suitable for the manufacture of sulphite pulp, since the product is of inferior quality and of small commercial value. This process, therefore, could only be worked at a loss. The alkali process is hardly, if at all, employed at the present time

in this country, and special arrangements would have to be made in order to carry out a trial by this method. It may be possible to arrange for a suitable experimental test on a small scale in this country, but as this experiment would have to be specially made, it would be necessary to defray the expense of it, which is likely to amount to between £6 and £7. It may, however, be better to get a trial made on a much larger scale either in Germany or Norway. Although it appears somewhat improbable that the wood can be successfully treated by this method, nevertheless it seems worth while to have a trial made, and this shall be done under the advice of our expert referees in pulp manufacture as soon as the Government of Natal consent to make the necessary payment to the manufacturer who undertakes the work.

July, 1899.

Experiments have been made on a small scale, under the direction of our expert referees on wood pulp manufacture, on the conversion of the black and white Acacia wood into pulp by the alkali (soda) process. Our experts report that the wood is easily acted upon by the alkali, and that on a larger scale probably less soda would be required than is needed for Scandinavian pine woods. Nevertheless, the general opinion is that the pulp produced from both these acacia woods is of inferior quality and value, even as compared with the pulp obtained from ordinary pine wood.

Two sets of samples prepared from white acacia and black acacia respectively are enclosed, and also a third sample prepared from the bleached sample of the white wood.

It is, therefore, very doubtful whether the manufacture in Natal of pulp from these woods would be a profitable undertaking, and our expert states that it is impossible to answer this question definitely without knowing the cost of fuel and labour in the Colony, as well as that of transit of wood to the mill.

Further, it does not appear probable that it would be worth while to ship the woods to this country on account of the cost of freight.

If this, and the previous report on the treatment of the wood by the sulphite process are communicated to those concerned in the Colony, they will probably be in a position to decide whether it is worth while to proceed any further in the matter.

September, 1899.

Keep a small box of wood ashes or charcoal where the pigs can get at it. It will do wonders towards keeping them healthy and their digestions strong. A little attention to matters of this kind will result in a more thrifty growth and quicker fattening.

Cotton and Ramie at Buluwana.

WHAT MR. E. LOFFLER IS DOING.

AN interesting report has been furnished to the Director of the Division of Agriculture by Forester Foster, of Ngome, on Mr. Loffler's experiences with cotton-growing at Buluwana, in Zululand. It will be remembered that we recently published in the *Journal* a few photographs illustrating Mr. Loffler's fields, and in the present issue will be found a few further pictures of interest. Mr. Loffler's farm is situated on the Buluwana River, about 15 miles west of Nongoma and four miles from the late Usutu Kraal. The farm is 100 acres in extent, all of which is fairly flat country with a gentle slope to the river. The soil is of a sandy nature, and appears to be very fertile, mealies, cotton, fibre, fruit, etc., doing splendidly. Very little frost is experienced at Buluwana, not enough to show any effect on crops; some years there is no frost at all. Being in a valley it is nicely sheltered from strong winds by the surrounding hills. There is a fairly good rainfall—not quite so much as Nongoma gets. About 34 inches of rain fell at Nongoma during the year ending June 30th, 1910.

Mr. Loffler states he had been experimenting with cotton for some time, and came to the conclusion it would do well on his farm so made up his mind to go in for it. In November, 1908, he put in about half an acre, part Caravonica silk and part Caravonica wool.

Mr. Loffler has since been advised by the British Cotton Growing Association that the "silk" would pay best; cotton spinners only used the silk in cotton spinning, the wool being used in wool spinning.

In September, 1909, and up till January, 1910, Mr. Loffler planted 60 acres of Caravonica silk.

In 1910 he sent to England samples of lint to the British Cotton Growing Association, who reported favourably on them. (A copy of their report is given below.)

Some time back Mr. Loffler received a letter from Messrs. Nathanson Commandite & Co. in which they said seed grown on his own farm should not be sown as the trees raised from such seed would bear inferior cotton. This, however, Mr. Loffler does not agree with, as some of his best cotton is from a tree raised from locally sown seed.

The trees are planted nine feet apart in the lines, and the lines twelve feet apart.

During the first season mealies were planted with the cotton. The mealies were planted first, and when about nine inches high cotton was

planted, about four seeds together, later on removing the three weakest trees. Mr. Löffler considers the mealies protect the young cotton during the first season. They also pay expenses incurred during the first season. Ten bags of mealies to the acre were reaped off this land. After reaping mealies, all stalks were removed from the land and the land between the lines of cotton trees was ploughed over. In ploughing, the soil is turned over towards each line of trees; cultivating is done between the trees in the lines with hand hoes. The land is kept well cultivated all the year round.

On slopes the trees are run in lines across the slope, which prevents the land between the lines being washed out during the rains. We believe Mr. D. Field recommends that the lines of trees should always run north to south and not in any other direction. This no doubt may be all right on a flat, but it would never do on a slope if the slope was north to south unless the cotton-grower wanted to see nice washouts after every heavy rain between his lines of trees.

During the second year Mr. Löffler prunes his trees. If the trees are properly pruned every year, not only are the trees kept a nice size and shape, but probably a better class of cotton is reaped from a pruned tree than from a tree that has been allowed to grow wild with all its branches rubbing against each other.

Mr. Foster was informed that seed sown in September and November the crop matured about April the first and second year. From a tree in second year's growth, about four pounds of unginned cotton was reaped. Up to date no cotton has been ginned, so it is impossible to say yet exactly what percentage of seed there is.

Mr. Löffler has just imported a Macartney gin. It is a self-feeding, single action, single roller gin (patent 1910) and was purchased from Messrs. Platt Bros., Oldham, England. Cost, £25 f.o.b. Liverpool. It is proposed to work this gin with a 2½-h.p. gasoline engine purchased from America some little time back. The Macartney gin is more especially adapted for ginning long-stapled cotton, such as Egyptian, Sea Island, etc. It separates the seed without crushing same, or in any way injuring the fibre. This gin will turn out 50 to 60 pounds of ginned Egyptian cotton per hour, and from 60 to 80 pounds of Sea Island or other long-stapled cotton, with pulleys running at about 750 revolutions per minute.

Mr. Löffler is very keen on experimenting. He is getting a hybrid from Caravonica silk and C. wool, which he thinks will be an improvement on both. He also wishes to try and get hybrid C. silk and Sea Island cotton.

RAMIE.

Mr. Löffler is also going in for ramie fibre, of which he has ten acres under cultivation. Ramie seems to do well in that part, growth last



COTTON PICKERS.

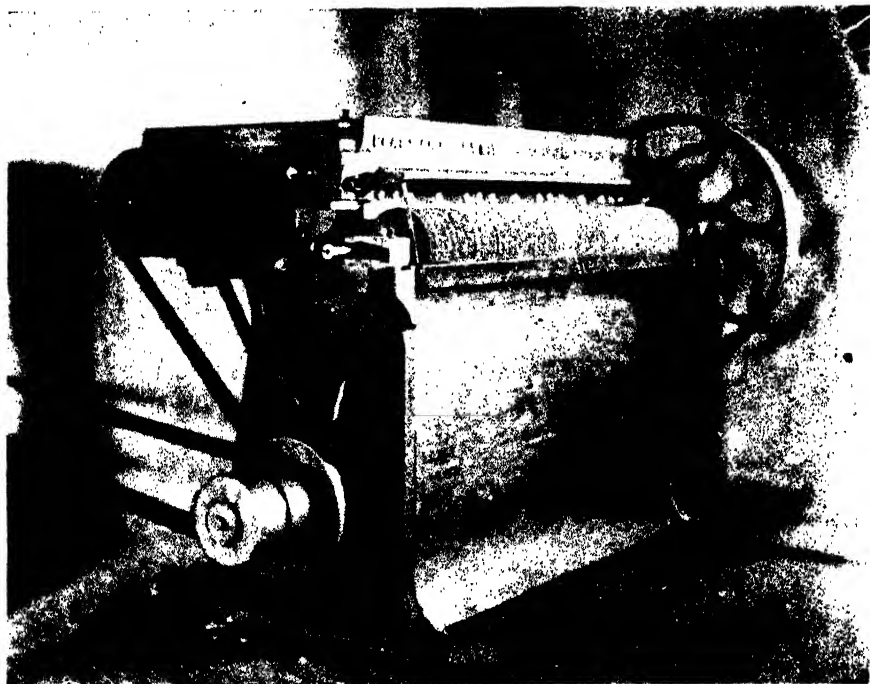
The above was taken in a Caravonica Silk field sown in September, 1909.



CARAVONICA SILK FIELD.

Sown, November, 1901.

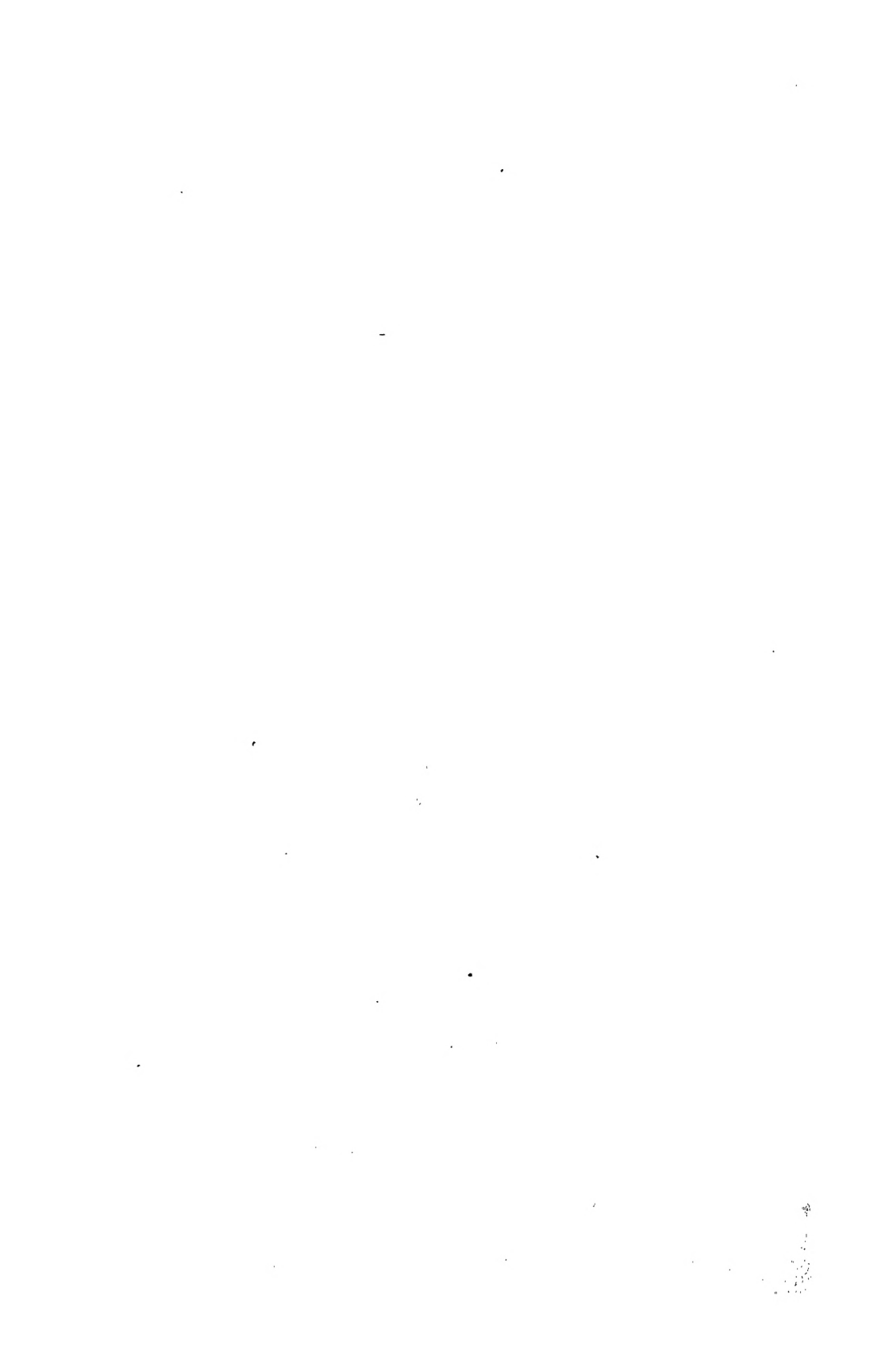
Cotton-growing at Buluwana. (*See Article.*)



MACARTHY COTTON GIN.

Self-feeding ; single action ; single roller. Floor space occupied, 4ft. 19 $\frac{1}{2}$ in. x 3ft. 3 $\frac{1}{2}$ in. Driving pulleys, 6 $\frac{1}{2}$ in. x 3in. x 3in. Speed, 700-1,000 revolutions per minute. Power required, about 2 $\frac{1}{2}$ h.p.

(See Article on Cotton Growing at Bulawayo.)



summer being, I am informed, six feet in six weeks, and same could be cut every six weeks during the summer. It is intended to grow ramie in conjunction with cotton, the cotton being picked during the dry season and the ramie being worked during the summer.

Mr. Löffler has been informed by an English firm that there is a demand for ramie fibre. All that is needed of the grower is to decorticate it, the degumming manufacturers prefer to do themselves. Mr. Löffler has purchased one of Faure's new patent ramie fibre decorticators, the cost being £65 landed at Somekele Station, Zululand, where it is now lying awaiting transport. With this machine, which it is proposed to work with the gasoline engine, two men can treat about 360 lbs. of green stems per hour.

REPORT ON SAMPLES OF COTTON.

Grown by Mr. E. Löffler.

Messrs. The British Cotton Growing Association, Manchester.

DEAR SIRS,—We consider the value and description of your cotton samples from Mr. S. Löffler, Zululand, to be this day as follows:—

No. 1, Caravonica Wool (2nd season's crop).—Good colour, long strong staple, moderately rough, substitute for Peruvian. If a little finer would compete with Egyptian.—*Value*, 12d.

No. 2, Caravonica Silk.—Rather creamy in colour, staple more irregular and softer.—*Value*, 10½d.-11d.

No. 3, Caravonica.—Good colour, moderately rough staple, shorter than No. 1.—*Value*, 11d.

No. 4, Caravonica Silk.—Clean, good colour, staple finer than other, would probably be substitute for Egyptian.—*Value*, 14d.—We are, yours faithfully,—

WOLSTENHOLM & HOLLAND.

RECIPE FOR WHITEWASH.

Take half a bushel of unslaked lime, slake it with boiling water, cover during the process to keep in the steam, strain the liquor through a fine sieve or strainer, and add to it a peck of salt (previously dissolved in warm water), three pints of ground rice (boiled to a thin paste and stirred in while hot); then add half a pound of Spanish whiting and 1 lb. of glue (previously soaked in cold water, and then heated in a small pot hung in a larger one filled with water); add five gallons of hot water to the mixture, stir well, and let it stand a few days, covered as nearly air-tight as possible.

The mixture can be coloured by adding ochre, lamp-black, ground keel, or blueing to suit. It should be applied hot, for which purpose it can be kept in a portable furnace.

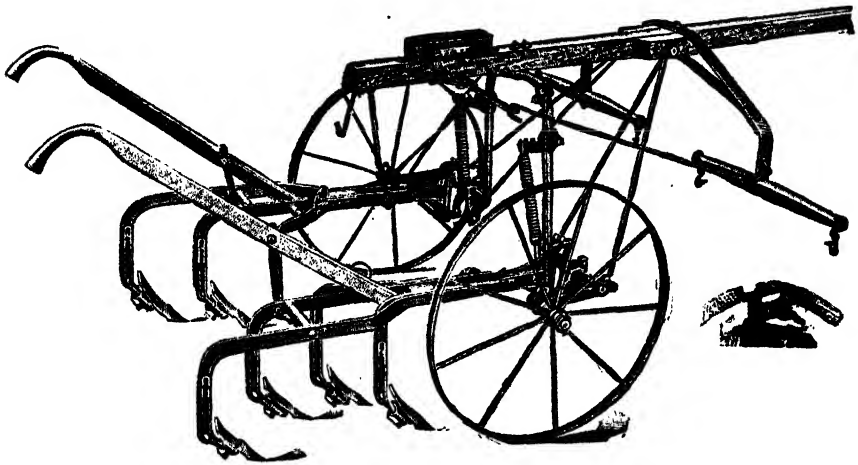
New Machinery for Farmers.

FURTHER NOTES FOR THE PRESENT SEASON.

IN our September issue we were enabled, chiefly through the courtesy of Messrs. Malcomess & Co., Ltd., of Durban, to refer to various new and improved farm implements and machinery which will be available for farmers this season. Since the publication of that article we have been prosecuting further inquiries among machinery firms, and have been in communication, in particular, with Messrs. G. North & Son, of Durban and Maritzburg, from whom we have secured some additional information as to mealie cultivators and planters, together with some particulars regarding cream separators and one or two other lines of interest.

THE ADJUSTABLE ARCH CULTIVATOR.

The expansion of mealie cultivation that has been so manifest during the past two years has specially attracted the attention of the manufacturers to the implements and machines required for this important crop. As a consequence decided improvements have been introduced in existing designs, furthermore some new lines of distinct value have been placed on the market. Especially is this so in the case of cultivators. Some two years ago Messrs. G. North & Son introduced what is known as an Adjustable Arch Cultivator, a decided advance on the still popular little scarifiers, inasmuch as with the Arch Cultivator both sides of the row are cultivated at one operation. Moreover, the gangs are hinged which permits of their being instantly manipulated from side to side, a feature which naturally adds to the value of the cultivator. Originally the adjustable Arch Cultivator was furnished with 2 gangs of 3 points, 6 in all, and this is the specification as usually sold. It, however, has been proved in actual practice that an additional point on each gang would greatly improve the implement, and we are pleased to say that Messrs. North and fitted with eight points. This is a feature to which we desire particularly to draw attention. We give an illustration of the machine herewith, fitted with eight points. The weight of the machine is 260 lbs., and the price £6 10s.



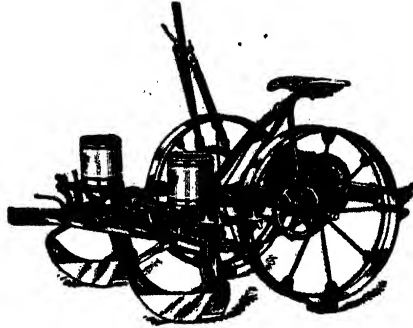
ADJUSTABLE ARCH CULTIVATOR.

(Fitted with 8 Points)

MEALIE PLANTERS.

Undoubtedly the machine that has played the most important part in the development of mealie-growing is the Mechanical Planter. A machine that furrows, plants and covers the seed, and with an attachment also sows fertiliser at one operation to the extent of 12 acres a day—the capacity of a 2-row planter—must of necessity be a strong factor in securing the largest possible return at the minimum of expense.

The planting mechanism of these machines has been undergoing a process of constant improvement during recent years. Much has been said as to the style most to be desired. We hear of the claims of what is described as the “edge” drop and also the “Natural” drop, but whilst in the early days of planter construction such terms might have been applicable as conveying some intelligible meaning they cannot be of any value as describing the mechanism of the up-to-date planters. Messrs. G. North & Son have an entirely new style seed plate in connection with their planters this season. In brief, the principle is that the seeds are individually and systematically conveyed to holes at the side of the plate, the holes being of such a pattern as to permit all seeds to pass through, no matter what their shape—plates with varying size holes being provided for all kinds of mealies. The advantage claimed for this method is that it is impossible for the holes to choke which certainly can happen when the holes are near the centre of the plate; in fact so decided is the effectiveness of this method that Messrs. North & Son guarantee the accuracy of their machine. Included in the plates with which the planters are furnished are plates suitable for soy beans. The weight of

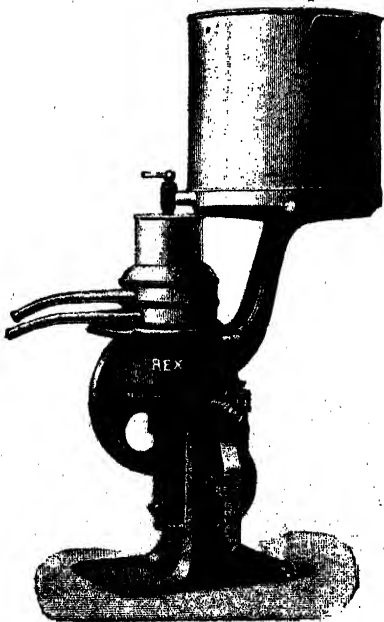


NORTH'S 2-ROW MEALIE PLANTER.

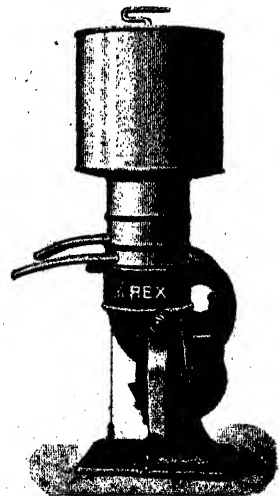
the 1-row planter, without the fertiliser attachment, is 130 lbs., and the price is £4 7s. 6d.; and the same planter with fertiliser attachment, 150 lbs., and the price £5 15s. The 2-row planter without fertiliser attachment weighs 350 lbs. and is sold for £11, whilst with the fertiliser attachment it weighs 425 lbs., and costs £3 more. The same planter (2-row, with fertiliser attachment) can be got with check chain as well for £17, the weight of the whole outfit being 500 lbs.

THE "REX" CREAM SEPARATOR.

The "Rex" Cream Separator is a beautifully and symmetrically designed machine, thoroughly well constructed and up-to-date in its fullest sense. It is only a matter of two years since Messrs. G. North & Son first



No. 1, 1A, and 2.

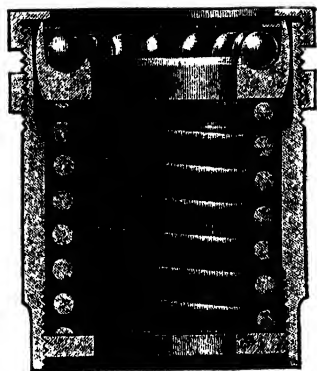
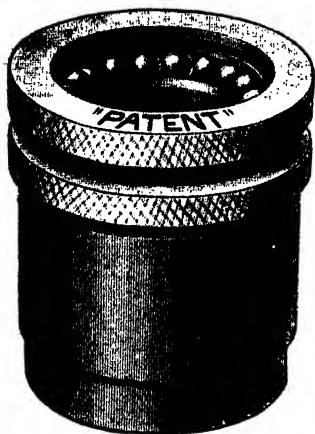


No. 3 and 4.

TWO STYLES OF THE "REX" CREAM SEPARATOR.

introduced the "Rex" Separator, when its undeniable high qualities were at once appreciated. Since that time advance in the scientific construction of separators has enabled several improvements to be introduced into the "Rex," which render it still more desirable a machine.

In this connection attention is specially drawn to the new Ball Bearing Bush with Vertical Spring. By the aid of this Ball Bearing



THE NEW BALL BEARING BUSH OF THE "REX" SEPARATOR.

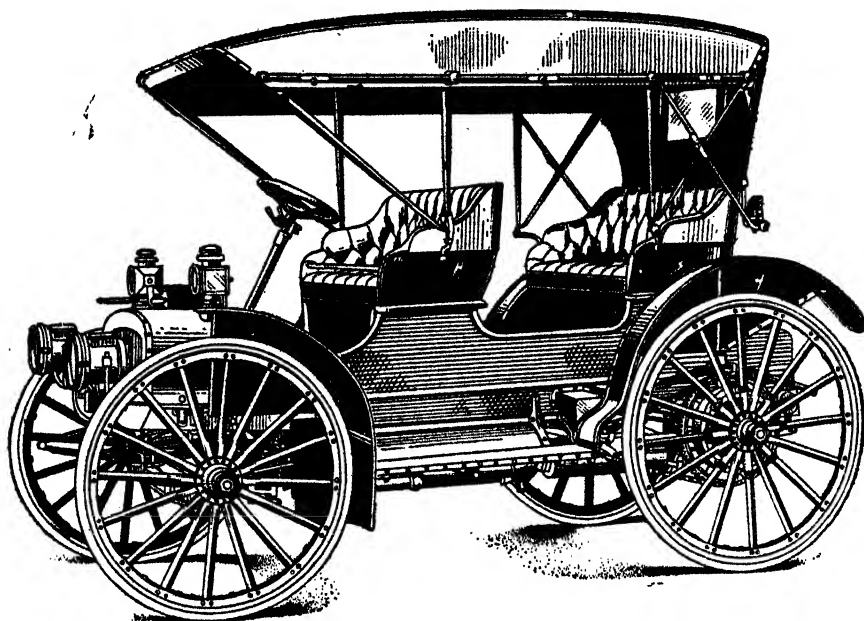
Bush, the "Rex" works easily, smoothly and silently, saving 50 per cent. of power. In fact, on account of the minimum amount of friction in the new "Rex" Spring Ball Bearing Bush, of which the frictional parts are manufactured of specially hardened steel, and are practically unwearable, a running has been obtained which not only required about 50 per cent. less power compared with other separators of the same size, but which is also smooth and silent. Messrs. North & Son stock the "Rex" Separator in various sizes, and also, it may be mentioned, stock a complete equipment of dairy appliances of every description.

The prices of the various sizes of this Separator are as follows:—No. 1, 20 gal. £9 (weight, 55 lbs. gross); No. 1A, 25 gal., £10 (weight, 65 lbs.); No. 2, 30 gal., £12 (weight, 85 lbs.); No. 3, 45 gal., £15 (weight, 90 lbs.); No. 4, 65 gal., £19 (weight, 110 lbs.); No. 5 (hand and power), 100 gal., £25; No. 6 (hand and power), £30.

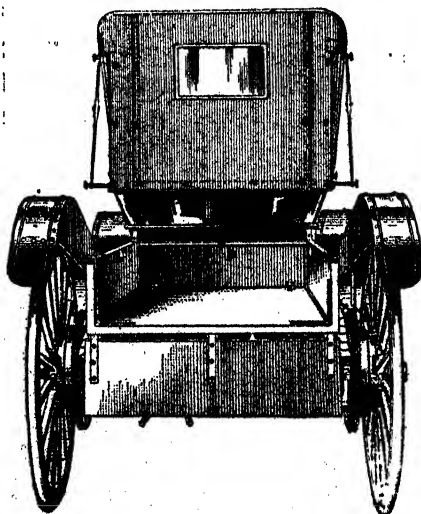
AUTO-BUGGIES AND WAGONS.

Messrs. G. North & Son are nothing if not enterprising. A line which they have recently taken up is the International Auto-Buggy. In America animal traction power for farm wagons and vehicles is practically a thing of the past, and undoubtedly in this country, where the farmers have to contend with so many difficulties in the way of transport

animals, suitable conveyances for which animal power can be dispensed with are desirable. The chief drawbacks have been the heavy expense of



THE INTERNATIONAL AUTO-BUGGY.



THE INTERNATIONAL SUTO WAGON.

motor cars, their unsuitability for the requirements of the farmers and the rough roads. To a very large extent these difficulties do not apply to the auto-buggy. The first cost of such a vehicle is materially less than that of a pneumatic-tyred car, the upkeep also less, and owing to the style of wheels used it is a much more serviceable and suitable vehicle for rough roads. Messrs. North & Son have already sold several of these buggies in this country and these are giving satisfaction. We illustrate the vehicle both as a buggy and auto-wagon. The price is £265.

Messrs. G. North & Son have appointed as sub-agents "The Motories," Durban, for these International buggies, also for the famous "Buick" motor cars, for which Messrs. North & Son are the agents. Samples of these buggies and motor cars are displayed at the show rooms of "The Motories" in West Street, Durban. Messrs. North & Son have asked us to state that they will be pleased to send a nicely illustrated descriptive catalogue of these various motors to anyone interested.

WHEN TO WATER HORSES.

A horse should be watered before feeding, and never given a large quantity of water after a meal, for the simple reason that the water will wash the food out of the stomach before stomach-digestion has taken place, and the food will not be well prepared for absorption; and, besides, it is sometimes the cause of colic.

There is a popular idea that a warm horse should not be allowed to drink, and, unlike a great many other popular ideas, there is a little truth in it. If you water a warm horse in the ordinary way, letting him drink all that he will, you are likely to have a foundered horse on your hands. This is especially so if, at the time, the horse is fatigued. Nevertheless, it is always safe to allow him from six to ten swallows, no matter how warm he is. If this be given on going into the stable, and he be allowed to stand and eat hay for an hour and is then offered water, he will not drink nearly so much as he would had none been given him before.

The danger is not in the first swallow, as we often hear it asserted, but in the excessive quantities that he will drink if not restrained. The most dangerous time to give a horse a full draught is when he has cooled down from fatiguing work and has partaken of a meal.—*Hawaiian Planter.*

From the 1st May to the 31st August has been proclaimed a close season for trout fishing in the Loteni River from its source to its junction with the Umkomanzi River or in any tributary thereof.

Poultry Keeping.

By S. WAYNE.

(A Paper read at a meeting of the Durban and Coast Poultry Club.)

IN March, 1897, it was my good fortune to get married. You may say, What has this to do with poultry reminiscences? but thereby hangs a tale. Eggs were scarce at that time of the year (fresh ones especially), and the price was high, and with all newly-married people not in affluent circumstances, ways and means had to be considered very carefully, and, as we were both fond of eggs, we decided that, if we must have eggs at a reasonable price, fowls would have to be kept. The matter dropped for a month or two, when, in the month of June, on my birthday, my wife decided the question for me by giving me a birthday present of a pen of barred Plymouth Rocks—a very judicious gift on my wife's part, considering the egg yield would presumably come into the larder. They were bought from Mr. J. Robertson, who at that time held a very strong hand in rocks and light Brahmias. My knowledge of poultry at that time was extremely limited, and fanciers will agree with me when I tell you that my knowledge of feeding them went no further than mealies, solid, morning, noon, and night. In spite of this supposed correct feed, the egg problem remained unsolved, as eggs came very slowly, and I noticed the birds getting very fat, and the crops began to swell and then fall down. On inquiry, I was told by a poultry expert that they were suffering from swelled crop, brought on by feeding too freely on mealies, and that I had better dose them with sweet oil. This did not have the desired effect of easing the swelling down, so I bought Wright's book on poultry to study up diseases, and found that an operation would be necessary at the stage the birds had arrived at. This operation of opening the crops was successfully performed, but the ill effects of excessive mealie feeding in small quarters laid the foundations of a wasting disease, which I found out afterwards was a form of tuberculosis, and I lost three of the birds. This was very disheartening for a novice, and I came to the conclusion that a course of reading in poultry lore was quite necessary if I was to have fresh eggs at a small cost. After reading up Wright's and a poultry journal, I decided that the white Leghorn was the commercial bird of the poultry fancy, and it wasn't very long before I sent an order Home to T. Cook & Sons for a pen of white Leghorns. During the interval before their arrival, a few fanciers in Durban started the Durban and Coast Poultry Club, namely, Mr. Wallis Short, Fred Smart, J. Fletcher, and

others, and I don't think this club, and I may say the Colony at large, can ever repay these gentlemen for the time and trouble they spent in laying the foundations of one of the most successful poultry clubs in South Africa, and, incidentally, by doing so, being the means of introducing pure-bred poultry right through Natal, increasing the egg yield by no inconsiderable amount, and the weight of table poultry, as, prior to this, as far as Durban was concerned, very few pure-bred birds were to be found. I will just put it in this way to you. Supposing our club, along with others, had not been started, and the consequent introduction of pure-bred poultry from the Homeland, what price would fresh eggs be to-day with the Kafir rooster as king of the harem, and our population trebled in the last 15 years? I take it that eggs in the summer would be at least 3s. per dozen, and in the winter 6s. per dozen, making fresh eggs quite a luxury instead of our present prices within the reach of everyone. And I must give credit to those Maritzburg fanciers who laid the foundations of their club, and the Durban names mentioned for bringing about this most desirable result. This is somewhat digressing from my personal reminiscences, but I feel, personally, I owe so much to these foundation fanciers of our club by their stimulating my interest in poultry generally, and also for the many friendships I have made amongst the fanciers.

To proceed, the pen of birds arrived in September by one of the Rennie boats. On looking at the pen, I thought I had got some real cracks. The cock bird had a comb the size of a small saucer, which I considered the chief point of beauty; its tail was carried well up, nearly touching the neck, which I thought was quite correct; the hens were cobby, tails well up, and flappy combs—in fact A1. Several new-fledged fanciers said they had never seen their equal. One or two of the older ones, who knew a thing or two, didn't go into raptures, but I put this down to "sour grapes." The only thing now wanting to complete my satisfaction was a show. Well, this came in due time, but not the expected prizes.

I was much astonished to find on entering the show the following year to their arrival, that only a v.h.c. had been awarded one of the hens; the cock bird, on which I had made sure of scoring with, had nothing up. I interviewed the judge, and I found that side sprigs on the bird's comb, along with squirrel tail, hardly gave it the right to be in the prize list. This pen I came to the conclusion was not the stock to lay the foundation of future prize-winners, and another order went Home for something good to that well-known breeder, S. B. Cheetham, who at that time was doing most of the winning in this breed. I was not disappointed. As usual they passed the severest criticisms with our then limited knowledge, viz., combs were looked upon as the chief point of beauty and value in the

bird. Not so to-day, and wisely so, as the cock birds then, and for some few years were bred with such enormous combs that only a bird in the pink of condition could carry the weight of them. If they were the least bit off colour, down went the heads between their legs. I had this pen only six weeks before I lost the cock bird from what I now know to be enteritis. At that time I had no idea what to give the bird for the best. If I remember rightly, Epsom salts figured largely in the attempted curing act. Fortunately, I had some four dozen eggs from the hens, and from these I reared about two dozen chicks, and the following show I scored my first win in White Leghorns (1899). It was a very proud day for me I can assure you. About this time my friend, Mr. A. Drew, got married, and I persuaded him to take up the White Leghorn fancy. He imported his first pen of birds, and as you fanciers all know we have had many a hard tussel as to who should gain premier honours in the White Leghorns. Some time one would have a good breeding year, and win well, and another time *vice versa*.

What times we used to have at the shows then, journeying up to Maritzburg in strong force to support the Maritzburg fanciers. I remember on one occasion when the late T. Cook was out on a visit, quite twenty-five of us going to the show, and we talked poultry and pigeons and archangels and bald pates from 6 o'clock till on arrival in Maritzburg. In those days we stayed at the Plough Hotel close to the market where the shows were held. I could never sleep soundly that first night, what with the cocks crowing in the market, and wondering if I should get a prize. Prior to the opening of the show at mid-day the suspense to the young fanciers was acute, and to get out of it we usually drove into the suburbs, but the question of who was likely to win would continually crop up, and the sporting portion of the fanciers would make up quite a small book on the various prospective winners. What is the reason of the falling off in these yearly trips to Maritzburg? Only about four of us went up this year. Personally, I have only missed once in ten years. Either the novelty has worn off, or there is not enough new blood coming into the fancy.

No doubt a good few of the old fanciers will recollect the show held in Mr. T. Alcock's. Mr. J. Fletcher was secretary at the time with Mr. C. A. L. Bull as assistant, and being war time (1900) Lord's was occupied. There was no market-house as it is to-day, and we were hard put to it to get a suitable room. It was a big undertaking up that narrow staircase, carting the pens and boards. It fairly knocked the enthusiastic secretary over, although at the close of the show he said he would like it all over again.

At this show I was a heavy winner in the White Leghorn class. This photo of the bird (not reproduced) will give you a first rate idea

of the style of bird in 1900. This bird won two first, two specials (no cups then), and was bred from the imported pen from Cheetham's. The smaller photo is the winner in the cockerell class Maritzburg (1910), and head of the breeding pen which won the Cornelius Cup in Durban this year. The photo of the hen winner, 1910, Maritzburg, 1st, and 1st and special for best Leghorn on show, gives one a good idea of the stamp of winners on to-day's shows. The hen shown in Harrison's Year Book of 20 years' ago will show the birds have altered. Comparing the two types, 1900-1910, in the cocks and allowing for the poor position of the 1910 bird, I must confess that the 1900 type as shown in photo is to my mind an ideal Leghorn. While admitting that size is a very desirable thing to aim at in your stock, it must not be brought about by sacrificing everything to it, in the way of type. This size in the body of the bird has had also the tendency of introducing long legs and knock-knees, which is certainly not desirable, nor to my mind is the low-lying tail: it certainly cannot claim to be equal in showy appearance to the higher carried tail as per 1900.

With reference to the laying capacity of big-framed birds and medium sized, I must give the medium the preference—although a large-sized white hen, if active, will lay as well or nearly so as the medium type; but as a rule I have found the larger the bird gets, the lazier it gets, and the egg production suffers.

What glories of the past in poultry lore are associated with our present Market-house, where for several years our shows were held! The Yard Committee in those days had no sinecure, but they were all fanciers, keen on getting through the work from 12 noon Saturday to 10.30 at night. To put up 1,000 pens called for some hard graft, but the lure of prospective honours in the prize-list sent the work merrily along. We are now more fortunate in having a fixed show, and the show work can be done more leisurely.

Very, very few of the old fanciers at the time of the formation of the club are still exhibiting. One recalls the names of Harry Beningsfield, H. Lello, Klaprott, Voysey, Harvey, Fred Smart, Allsopp, and several others, who were keen exhibitors in the early days, and in recalling these names it brings with it many pleasant reminiscences of by-gone days in the fancy.

It may be of interest to those now in the fancy to say something of the financial aspect of poultry-keeping, as covering the number of years of which I have kept a record of the same. It must be borne in mind that the poultry fancy wants an apprenticeship, the same as any other trade, and one cannot hope to make money from the start, unless a course of training has been gone through. Many bitter experiences have to be passed through before success financially comes. Especially was this so

in the early days, when all our birds had to be imported from England at big prices. Very often the birds in acclimatising died, and one was quite at a loss to know what remedies to give the birds, being unable to diagnose the disease or trouble. Nearly all the birds so imported died from what we now know to be enteritis in the poultry world. When one pays £30 for a pen, it takes some making up, on the limited number one was able to rear on the somewhat limited ground at one's disposal.

My account-book (Wright's) starts in 1897, and, like "Johnnie Walker," is still going. Up to 1905 I kept a record of all the eggs laid daily, and how disposed of. It runs as follows: 23,270 laid, 4,974 sold, 3,780 set, balance consumed in the house. Working on the same basis from 1905 to 1910, I estimate the consumption in my house to be in the vicinity of 23,000 eggs during 13 years. Marshalled into coin of the realm, this means at 2s. per dozen, £191; add to this the credit standing at revenue over expenditure (£34) gives £235, and the stock now running to the good—and I think to-day I have as valuable a stock as any Natal breeder. This may seem a poor result from 13 years, but I am satisfied; and you must admit by the foregoing figures that personally I have solved the egg problem by producing fresh eggs for home consumption at a much less figure than I could have bought them for.

Remember, also, the days of apprenticeship are costly, and it is only in after years that one reaps the reward financially. But, apart from the direct financial profit shown, what might not have happened if I had not taken up this fascinating hobby? Expensive pleasure might have been the result; and it is also a source of satisfaction to me that, as a fancier of 13 years' standing, I claim in some small way to have assisted the material wealth of this Colony by breeding a race of birds not to be beaten in egg production, which stock has found its way to all parts of Natal and the Transvaal.

I will now touch on the breeding of White Leghorns. No doubt many young fanciers think that if they can only get together a pen of prize-winners every chick hatched and reared should, in its turn, become a prize bird, and so on *ad lib.* My experience is somewhat different. At various periods I have bred from pens of winners—every bird a card, from first downwards—winning in keen competition. And the result has been that the progeny of these pens, at the age of three months—when one can get a fair idea of how they are likely to turn out—probably result in two chicks out of every hatching showing promising signs of having a chance of being in the card list at the next show. So, to those going into the fancy I say: Don't blame the party who sells you eggs from prize stock if, when you have reared the chickens to maturity, and decide to exhibit, you only get a v.h.c. card. On the other hand, this same stock may in the following year breed you the first prize-winner. I don't think

many of us have had the time to devote to a study of Mendel's "Laws of Breeding" and what is likely to result from following it up, or we might probably get a much larger percentage of show birds.* I still have Cheet-lam's strain in my yard, which I purchased 11 years ago, and I also must have some slight trace of blood from the would-be champion which I got from Cook's yard—the bird with the side sprig—as occasionally a bird with a side sprig on its comb will appear. I have never bred from birds with side sprigs, except in this one instance; it shows how birds will throw back after years.

I always try to get an even lot of hens together for breeding from—combs clearly cut, and good shape in body. I find better results accrue in this way than by making up a pen of birds that have one particular good point, and the remaining points very different. The cockerel or cock must stand well on its legs, and the broader apart its legs the more stamina the chicks have as they grow up. I prefer a cock-bird with four serrations only in comb. You get the more pyramid serrations in the progeny by doing this. Of course, this is a purely fancy point.

The Leghorns of to-day don't seem to have that stamina they possessed years ago. I am afraid the exacting demands of the show pen and in-breeding for points are mainly accountable for this result. I certainly don't have the success in the rearing of White Leghorn chickens that I had in the early days—the White Leghorn not being a recently-made breed—with the stamina of the crosses in it like the Buff Orpingtons; and, having been inter-bred for years, for show points, it is becoming more difficult to rear to maturity. The high type to which it has now been bred for years seems to call a halt, and to revert back a little to our 1900 type, and get more stamina in the race, as it is an undoubted fact right through Nature, the higher the type the more difficult to rear in quantities. In comparing the harness of the two breeds—White Leghorns and Buff Orpingtons—the latter of which I have bred off and on for some years, utilising the hens as mothers to the White Leghorn chicks, I put down as follows:—Fifty White Leghorn chicks hatched during the season. If at the end of the season I have 20, I have had a good season, and the Buffs 50 should see reared to maturity at least 40. I think this statement is not likely to be refuted by anyone having bred the two breeds for the show pen. I have for many years given eggs out on quarter shares to various friends, but they don't seem to rear more than 50 per cent. under the most favourable circumstances.

(To be continued.)

*Poultry keepers, as well as other breeders of stock, will doubtless be interested to know that in our next issue we propose publishing the first of a series of articles on mendelism.—ED. N.A.J.

Cattle Dipping.

AN IDEAL CHEAP DIPPING OUTFIT.

Now that the dipping of cattle has been recognised as being so important a factor in exterminating the medium through which the dread disease of East Coast Fever is spread, and thus minimising the danger of infecting cattle, the question of a cheap and effective plant becomes one of first importance to cattle-owners, and the annexed drawings will be of interest to those farmers who have decided to be up to date in this respect.

Despite the reports issued by the Government Bacteriologist, there is apparently still a feeling against the dipping of cattle, among numbers of cattle-owners, on the plea of injurious effects to cattle. The opinion of those who dip regularly and very thoroughly does not appear to coincide with this idea. Mr. Joseph Baynes, of Nel's Rust, says:—"On the whole the thorough dipping of cattle is highly beneficial. It affects working oxen very little, if at all; the cattle on this estate proceed direct from the dipping to the work. While the dipping may, perhaps, diminish very slightly the supply of milk on the day of dipping, yet I am of opinion that by improving the general condition of the cattle, the aggregate supply is considerably increased. *Cattle which are regularly and thoroughly dipped are decidedly freer from other diseases than E.C. Fever than when not dipped.* I have found the mortality among my calves to be immensely decreased since commencing to dip; I have never experienced such a small percentage of deaths among calves as this year."

Mr. G. C. Mackenzie, of Buccleuch, says:—"I have no hesitation in saying that I consider dipping very beneficial to my cattle. There is no doubt that the cattle are to some extent affected adversely by the dip, especially working oxen on a hot day, and the milk supply is for two days somewhat reduced. These are, if they may be so called, the disadvantages of dipping. On the other hand, I have found that the aggregate supply of milk, taking the same number of cattle, is considerably greater since commencing dipping than when I was not dipping. Further than this, I find that numbers of diseases from which I incurred great losses are now practically non-existent. I used to lose fully 30 per cent. of my increases every year from various diseases. Now, I think I am not exaggerating when I say that 2 per cent. is nearer the mark. With reference to working oxen, I find that I can get a very fair day's work out of them by working early in the morning, outspanning during the heat of the day, and working again till late in the evening. The eye disease, by which

many of my cattle were damaged, has practically disappeared, and I am of opinion that if thorough dipping were generally practised throughout the country, many of our calf diseases would entirely disappear."

Notwithstanding the feeling against dipping which still persists among a section of farmers, the majority of cattle-owners regard with more or less favour the cleansing of cattle by this means; and there is no doubt that if a good dipping fluid is used and the work is done sufficiently often this is one of the best means, if not the best, of ridding cattle of ticks.

Visitors to recent agricultural shows will probably remember the concrete dipping tank shown there by Messrs. John Wright & Sons, of South Coast Junction, Natal and Zuurfontein, Transvaal, as well as the various wattle wood fittings exhibited by the Clan Syndicate, Ltd., of Crammond. Our attention has been drawn to a cheap dipping outfit which can be secured by a combination of Messrs. Wright & Sons' concrete dip and the races, gates, and other fittings which the Clan Syndicate is now supplying. A few words first about the tank. This of reinforced concrete, and is stated to be splendidly watertight. It is made in portable sections, and may be erected by the farmer himself without skilled labour. When once erected, owing to its being concrete, it increases in strength and becomes more durable with age. The material employed in the construction of the tank is a combination of cement concrete and iron rods, which material is so proportioned and disposed that the desirable properties of both are retained, while those which are undesirable are eliminated.

The accompanying plan shows the various fittings of wattle wood which the Clan Syndicate is supplying for use in connection with this tank. The kraals are made of wattle wood, and are recommended only where cheapness is the main object. The suppliers consider that these will not last longer than about three years, and where kraals are required to last longer without replacing the material, other posts, such as sneeze-wood or jarrah, are recommended, and rails such as second-hand piping should be used. In some cases, however, it is found to be cheaper to use wattle and replace this every three years rather than the more expensive timbers. The posts are well charred 4 feet from the butt. The rails may be attached either by bolting or wiring. Each rail will take three bolts, 9 inches, 8½ inches, and 8 inches by ¾ inch thick. Bolting makes the firmest job, but wiring is cheaper and quite strong enough. This is done by boring a hole through the post, and another through the rail, and passing, say, a No. 8 galvanised wire through the two holes, then round the post and rail, and fastening by twisting. This is a very cheap, effective, and simple method. Full directions for the erection of the gates are supplied by the makers on application.

The gates are excellent, and for this purpose cannot be beaten. Their strength, appearance and low price have astonished numbers to whose notice they have been brought.

Special attention is drawn to the crush pen and slide gates. The crush gates are, while not being too heavy, exceedingly strong. By the use of these cattle may be squeezed tightly, so that they may be branded, closely examined, tails clipped, etc., etc., without trouble or danger to those operating. The ratchet catch is a great improvement on anything else which is at present in use, and the ease with which this enables the gate to be manipulated will appeal to those farmers who have had experience with the old-fashioned styles of catches. By means of these gates, too, the beast may be let out of the race without being put through the tank if for any reason this be deemed necessary.

The slide gates are hung on runners, and slide in front and behind the crush gates to stop the beast going too far or backing from the crush pen. Easily manipulated, these are a great boon. The beast may be penned in the crush pen without squeezing, if necessary, till further notice, and can be let either back or forwards at will.

In connection with these gates it should be noted that they are, of course, suitable for almost any purpose for which gates are usually used. The Clan Syndicate make a number of different patterns, including ornamental gates, of which full particulars may be obtained on application.

The plan shown is that of a complete dipping tank with race, whilst the alternative style, the dripping pens, is also shown. The suppliers strongly recommend the latter style for several reasons. Those who have had the experience of the dripping race complain that the cattle are not properly dripped by the time they get through the 100 feet race, and there is danger of damaging the veld round about the tank, in addition to the loss of a considerable amount of dip each time the cattle are dipped. In addition to this, the dip in the tank becomes more fouled by use of the dripping race. In the case of the dripping pens, cattle may be kept in these till thoroughly dripped, and let out only when this has been ensured.

The cost of the kraal material only for the dripping pen style is £4 18s. 11d., and for the complete set of gates £9 7s. 3d. f.o.r. Cramond Siding. The weight of the whole lot amounts to approximately 18,000 lbs.

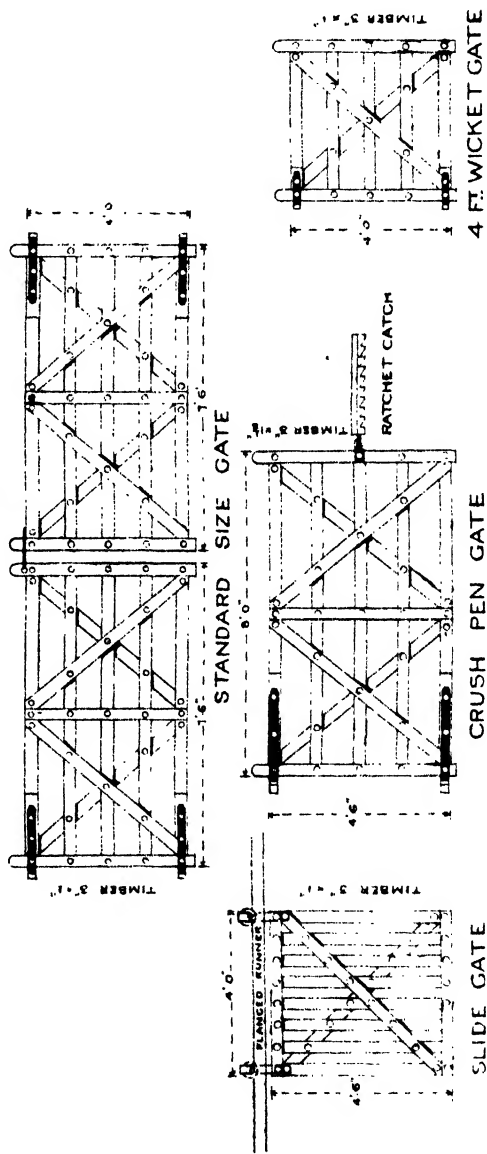
The floor of the race or pens is usually bricks in double layer, well grouted with a one to four mixture of cement and sand. If the ground under the floor is good, a single layer would probably answer the purpose, or concrete floors may be put in.

The Maritzburg agents of the Clan Syndicate are Messrs. Tennent.

The diagram illustrates three alternative styles for cattle dipping tanks:

- COLLECTING KRAAL:** Features a 7' 6" gate at the entrance, a 30' long section, and a 7' 6" gate at the exit.
- DIPPING RACE STYLE:** Includes a 7' 6" gate, a 40' 0" section, and a 100' section.
- DIPPING PEN STYLE:** Shows a 7' 6" gate, a 20' section, and a 7' 6" gate.

Other labels include CRUSH GATES, SLIDE GATES, and TANK.



and Co., Box 314, and in Durban Mr. W. B. Southwood, 11, Jackson's Buildings.

We have drawn attention to this dipping outfit because of its simplicity of construction, and its cheapness, which brings it within the reach of most cattle-owners. The two points that appeal to us are the ease with which the dipping tank itself may be constructed, and the fact that the woodwork for the fittings—races, kraals, etc., is obtained from a locally-grown tree—and a by-product to an already established industry. For the farmer, of course, the chief considerations are the simplicity of construction and the relative cheapness of the whole outfit.

Two Useful Fruit Tree Remedies.

We have received from Messrs. L. W. Odell & Sons, the well-known Maritzburg firm of ironmongers, etc., some interesting literature with regard to Swift's Arsenate of Lead and Spratt's "Scalecide," for which they are agents in Natal. The Arsenate of Lead has come to be a well-known and good poison for leaf-eating insects, and is rapidly widening its sphere of influence all over the world. Pratt's "Scalecide" is also making headway as a fungicide, and is now much used in orchards in the United States. We advise all owners of orchards or fruit trees to write to Messrs. Odell & Sons for copies of their pamphlets in references to these two useful remedies for orchard pests, and also to ask them for the name of the nearest agent, as Messrs. Odell have a large number of representatives all over the country.

New milk should not be given to young poultry; it is too rich for them, and they do not grow as fast on this as they do on water. Skimmed milk is good for chickens, but they usually waste it if given them to drink, and the most economical way is to mix their soft food with it, for there is no waste then, and the chickens relish their food better.

Young dandelion leaves chopped finely are excellent for young chickens. They prevent overflow of gall better than anything. Watercress is also an excellent thing, but the cost is generally prohibitive. If young chickens are not doing well, it is a good thing to change their food. Boiled rice is very good for a change, but they must not have too much of it, although they are very fond of it.

The Living Bee.

By MARY RITCHIE,

President, Natal Bee-Keepers' Association.

Continued from page 451.

CHRISTIAN KONRAD SPRENGEL.

LET us leave the sermon unfinished and the book unread and follow this old German schoolmaster into the garden and watch the bees. Konrad Sprengel, born in 1750, was not the first to watch the bees among the blossoms, but he was the first to question Why? Why did the flowers yield nectar to the bees, why did the bees carry pollen to the flowers? And it was all so interesting, and so wonderful, and so beautiful that he forgot his parochial duties—for he was a clergyman first—and even his sermon, and in consequence lost his post and had the whole Sunday afternoons free for excursions over the hills. Had we lived in those days we might by the payment of a few *groschen* have joined his open-air class, though running the risk, of course, of being called altogether foolish and peculiar.

It is a commonplace to us that the stigma of the flower must receive the yellow fertilising dust before it can set seed, but this was not known in Sprengel's day. Before his time, one, Camerarius, had proved that plants possess sex, one Koelreuter had shown experimentally that plants of different species can be united, and hybrids produced, and he it was that also first recognised the importance of the insect world in the work of pollination. "In flowers," he says, "in which pollination is not produced by immediate contact in the ordinary way, insects are as a rule the agents employed to effect it, and consequently to bring about fertilisation also: and it is probable that they render this important service, if not to the majority of plants, at least to a very large part of them, for all the flowers of which we are speaking have something in them which is agreeable to insects, and it is not easy to find one such flower, which has not a number of these creatures busy about it."

AN OBSERVER OF GENIUS.

Like Camerarius and Koelreuter before him, Sprengel was an observer of genius. He surpassed them both, however, in boldness of conception, and was therefore even less understood by his contemporaries and successors than they had been by theirs. By a study of phenomena apparently trivial and open to the eyes of all men, he arrived at ideas of the greatest importance and far-reaching results, for he showed that

the construction and all the peculiar characters of the flower can only be understood from their relation to the insects that visit them and effect their pollination. His own words are as follows:—

“In the summer of 1787 I was attentively examining the flowers of *Geranium sylvaticum*, and observed that the lower part of the petals was provided with slender rough hairs on the inside and on both edges. Convinced that the Wise Framer of Nature has not produced a single hair without a definite purpose, I considered what end these hairs might be intended to serve. And it soon occurred to me that on the supposition that the five drops of juice which are secreted by the same number of glands are intended for the food of certain insects, it is not unlikely there is some provision for protecting this juice from being spoilt by rain and that the hairs might have been placed where they are for this purpose. Since the flower is upright, and tolerably large, drops of rain must fall into it when it rains. But no drop of rain can reach one of the drops of juice and mix with it, because it is stopped by the hairs, which are over the juice drops, just as the drops of sweat falling down a man's brow are stopped by the eye-brow and eye-lash, and hindered from running into the eye. An insect is not hindered by these hairs from getting at the drops of juice. . . . I gathered from this that it is for the sake of the insects that these flowers secrete the juice, and that it is secured against rain that they may be able to enjoy it pure and unspoilt.”

A DISCOVERY.

He afterwards discovered that the stigmas of a species of *Iris* were absolutely unable to be fertilised in any other way than by insects, and further observation convinced him more and more that many, perhaps all, flowers, which have this juice, are fertilised by the insects that feed upon it, and that consequently this feeding of insects is in respect of themselves, an end, but in respect of the flowers, only a means to an end, namely, their fertilisation; and that the whole structure of such flowers can be explained, if in examining them we keep in sight the following points: First, that flowers were intended to be fertilised by the agency of one or another kind of insect, or of several; secondly, that insects, in seeking the juice of flowers, and for this purpose either alighting upon them in an indefinite manner, or in a definite manner creeping into them or moving round upon them, were intended to sweep off the dust from the anthers with their usually hairy bodies or with some part of them, and convey it to the stigma, which is provided either with short or delicate hairs, or with a viscid moisture that it may retain the pollen.”

And so summer after summer he watched the bees among the flowers and puzzled over what he saw until he could keep silence no longer and

resolved to publish a book about it, and with childish delight and pride he called it the "Secret of Nature Discovered."

But the botanists indoors would have none of it—what childish fancies they said, what foolish fables! The botanists at that time were slaves to asystem and had little interest to spare to new ideas.

A FAIRY TALE OF SCIENCE.

When Linneaus classified his plants according to the number of stamens they possessed he had no idea of their use to the plant; he counted them, but that was all; nor had any of the systematists who followed so toilsomely in his footsteps. To describe and name, to arrange and classify was all that Botany meant for them—plant *forms* to be compared and analysed, not plant *lives* to be studied and understood. They had little interest in such outdoor labours.

In such cases, says Sachs, it is the character of less gifted natures to deny the facts, or to disregard them rather than to sacrifice their own favourite views to them. In some instances the facts would have interfered with their philosophy, so they preferred to ignore the facts! So the author was slighted and his book neglected, and, strange as it may seem to us, his book lay for nearly a hundred years neglected, till rescued indeed by a modern botanist, Charles Darwin, and people believed when they read his book "The Fertilisation of Orchids."

Darwin saw that Sprengel's writings were no foolish fairy-tales, but the truest of all fairy-tales, the fairy-tales of Science.

Modern botany dates from Darwin just as truly as systematic botany dates from Linneaus and microscopic botany from Swammerdam, but botany for bee-keepers dates from those sunny summer afternoons when Sprengel found botany so entrancingly interesting that he neglected his sermon and went out into the fields with his pupils, to consider the lilies.—how they *grow*.

Every hen that does not pay for her keep by laying eggs should be sold at once. There are thousands of hens in the poultry yards that are losing money for their owners. Find out whether you have such hens, and if so get rid of them.

Some poultry-keepers do their chickens a great deal of harm by giving them food which is too rich for them to digest, and their organs become clogged, and this causes an overflow of gall upon the liver sooner than anything. Too much meat and fat is not good for them; a little, however, is very beneficial.

The Control of Swarms in Spring.

By W. J. FULLER.

MANY people complain that during September and October they are troubled with their colonies sending off swarms which they either cannot catch, or, even if they could catch them, have no further use for them as their apiaries are already full.

It is a serious thing to have the hives depleted of bees just at a season when the colonies should be building up to the "boiling over" stage, so as to be ready for the honey flow when it arrives.

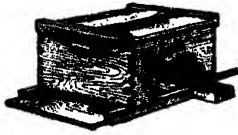
The chief cause of swarming is overcrowding, and the obvious remedy is to give more room.

It is the practice of many apiarists in the Midlands and Highlands of Natal to take off the super in winter and so confine the bees to the brood chamber for the sake of warmth generated by the large number of bees in the small space, and many have said that by this method they start the spring with a greater number of bees than if they left the super on.

Now, the obvious result of this is that, as there is always a certain amount of honey to be gathered all the year round in Natal, the bees will deposit the honey in the brood chamber and will continue to do so even after the super has been put on, with the result that the queen has no room to lay and the bees make up their minds to swarm.

If the super has been left on all the winter the bees have more room, and, while there will be a certain amount of honey deposited in the brood chamber, there will not be anything like the same quantity. In the colder districts it will, of course, be necessary to protect the hives from the cold, which can be cheaply done by simply dropping a packing case over the whole hive, leaving a hole one inch square for an entrance. It is not recommended, however, that supers containing sections which are intended for sale should be used for this purpose. Sections should always be filled rapidly, as if left on the hive too long the wax is liable to be discoloured. There are always plenty of half-filled sections and extracting frames that can be left on the hive, which may be later on used as baits or consumed in the home.

E. W. Alexander (one of America's leading authorities on bee-keeping) advises that in early spring the hives should be examined and all honey in the brood chamber should be extracted. This honey is to be diluted with an equal quantity of water and a little given warm to each colony every day for about a month. That should give, by the beginning of October, strong, full colonies.



If Alexander's advice is taken and followed up there will be no trouble with early swarms. Mr. Alexander invented a bee-feeder for this purpose, which is now recognised to be the most useful and simple in the market. As the illustration shows, it is placed at the back of the hive, and if the bees are fed at sundown there will be no "robbing."

Every apiarist should see that all his queens are clipped after they have been mated, so that, should the bees swarm, the queen will just drop in front of the hive, and you have the swarm under control, with which you can either start a new colony or you may unite them by the following method:—Take the old hive some little distance away and place a new hive on the old stand filled with full sheets of wired foundation, then place the queen in a cage in front of the entrance. The swarm, not finding the queen with them, will return to their old place, and when they have discovered her will begin to enter the hive. After they are well started running into the entrance the queen is released and she will go in with them. Most of the flying bees will go back to the old stand, and those that remain can be shaken off in front of the hive. The queen cells will then be cut out, and the old brood chamber can be placed on top of the new one, with queen excluded between. All the young brood will be taken care of and hatch out. The old brood chamber may remain on and be used for extracting purposes, or if comb honey is required may be removed after three weeks and replaced by a super.

In this way the bees' craving for a new home is satisfied, they are enabled to use the wax scales which have formed on them, and there will be no loss in the strength of bees.

Dr. Miller, of America, has advised the ventilation scheme for the prevention of swarming, and, while a modified Miller scheme might be used with advantage during the hot months, it is not advisable to practice it in the early spring when we get cold nights.

Dr. Miller seems to derive advantage from his scheme during a honey flow. Many people, however, have asked the question, "How can Dr. Miller prove that ventilation prevents swarming?"

The logical inference is that when the hive is so crowded with brood and honey, and the atmospheric and other conditions suitable for brood-rearing, the bees are incited to swarm. Now, the only way to check this is by either giving the colony more room or by preventing the queen from laying. If you ventilate a great deal you may certainly check swarming by checking egg production, but at the same time you are taking a great number of bees off the working list, therefore the line to follow is to give more room.

Examine the hives frequently. If the super contains any fully

sealed sections or extracting frames, take them out and replace by empty frames with full sheets of foundation. In this way you keep the bees working hard and without discouragement.

On page 347, *Gleanings of Bee Culture*, June 1st, 1910, Mr. Jay Smith on this subject writes as follows:—

Some time ago I described in *Gleanings* how I used two hive-bodies for brood-rearing and then reduced to one for the honey flow. This system was good; and when it came to getting a host of bees on deck at the critical moment it worked to perfection. But it had several drawbacks when running on a large scale. When it came time to put on supers it was a job to open hives and put all brood in one body. And then some of the hives I took off had brood in them. This had to be looked after. Then a lot of the honey in these extra bodies was unsealed honey. This had to be put on a hive or it would have soured.

The system I have used for two years back has all the advantages of the above, and none of its disadvantages. Instead of using two full hive-bodies I use one Danzenbaker hive and a shallow super filled with extracting-combs. When raising brood before the honey-flow this super is on the hive, and the queen has full sway, and can lay in the hive-body or upstairs as her royal highness wills. Now, the swarming season comes on just after the flow starts; and unless one has plenty of room for the queen to lay, as well as room for honey, swarming will be the result. But leave this on shallow extracting-supers till the bees are busy gathering, and then raise it up and put the comb-honey super on between the extracting-super and hive. As will be seen, this gives more room right in the middle of the brood-nest; and, instead of cramping the bees, and forcing them into the supers and forcing swarming when the super is added, it really gives more room and checks swarming. The bees will at once begin drawing out the foundation; and as soon as this is nicely begun, the comb-honey super should be brought on top of the extracting-super, or there will likely be pollen and possibly brood in the sections. After this is done, a queen-excluder should be put next to the hive-body or the queen will again occupy the extracting-super. In a short time all the brood will be hatched in the extracting-super, and it will be filled with honey, and capped. It should then be removed and extracted. The comb-honey super will have work well advanced, and this is then placed next to the hive, where it will be finished in a hurry without any light-weight sections.

As soon as the flow is over, the empty extracting-super is placed on the hive again, and the queen at once fills it with eggs. If the prospect is good for a fall flow, the above plan is again carried out. If not, they are left as they are all winter. The super is filled with dark honey, and the bees arrange their nests for winter. They usually form their cluster so

that the space between the super and hive-body comes right in the centre of the cluster. This gives them the best of communication with each other all winter. They also have a lot of honey so that they will not be stingy with it when they need it for brood-rearing in the spring.

I see some writers think that bees rear brood just the same whether they have one pound of honey ahead or twenty-five. It seems strange to me that they would accuse the bee, that is considered the most intelligent of all insects, of raising a lot of young bees to use up the last drop of honey and then starve to death! I know from experience that they very carefully keep account of the store ahead, and raise brood accordingly; and with plenty of comb space and honey it is surprising what they will do in the way of bringing a lot of bees on the scene just when they are needed.

I wish to protest against another statement that has been made several times, although I cannot recall when. Several have said that if one extracts from black brood-combs the honey will not be as white as from new white combs. My experience proves to me that there is no ground for that statement. I will give one of my experiments. I picked out ten of the blackest brood-combs that I could find, extracted the honey, and put it in glass jars. Then I thoroughly cleaned the extractor, and extracted from ten new combs as white as snow. I set these jars with the others; and when I went to compare them I was unable to pick the last ones out of the lot. I compared the colour and tasted of the honey, but could see no difference.

I have been using Mr. Townsend's plan of putting extracting-combs at the outside of the sections, and feel that in this Mr. Townsend has given the bee fraternity a most valuable kink.

I am running eighty colonies on this plan this year, and I have never had a single case of loafing, and the bees work with all the energy they possess. When I read of some who let the hive-body get clogged with honey, and the bees cluster out, and they "shake" energy into them, I thought the bee-keeper was the one who needed shaking instead of the bees. With the above system I usually have about six per cent. of swarms. This was the worst year for swarms I ever had, and the per cent. of swarms was ten.

Vincennes, Ind.

As a means for keeping ants away from plants in pots and boxes, water containing a little kerosene has often been recommended. As an alternative to this, a solution made by dissolving a piece of camphor about the size of a filbert nut in two quarts of warm (not boiling) water, and applied when cold, may be used.

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

USE OF EXCLUDER ZINC.

THERE are now two kinds of excluder zinc in use. That known as the B.B.J. pattern, the holes of which are long with oval ends, and are cut out of a sheet of zinc. They have a slight button one side, which should be on the upper side when the excluder is placed on the brood frames. The other is a recent invention, and consists of five wires placed parallel, and at the correct distance to prevent the queen passing through. One critic has his doubts about it, because he does not consider the distancing mathematically correct. Let that be as it may, I have no hesitation in saying that if it works successfully in practice it is miles ahead of that used hitherto, as it gives freer access to the bees in passing to and fro. To have the minimum of obstruction with either sort, if placed flat upon the frames, the holes must run across the frames. With either, access to the bees is immensely increased by placing the sheet on a frame, raising it a quarter of an inch above the brood frames.

FERTILE WORKERS.

The presence of a fertile worker cannot be ascertained when first she commences work by any outward appearance of the hive, but the worker bees will gradually diminish in numbers, and lack the energy of a stock in normal condition, and in due course drones will appear; then you have a certain sign of a drone-breeding queen or a fertile worker, more probably the latter.

ASCERTAIN PRESENCE OF QUEEN.

If you cannot see the queen when looking over the frames you may come to the conclusion that she is there if you find eggs and brood in various stages; as pollen is being carried into the hive it is a pretty sure sign that breeding is going on within.

HOW TO TREAT A COLONY WITH "NATAL FEVER."

How to treat profitably a hanging-out, loafing colony has always puzzled bee-keepers. A sulky colony is of no real value so long as the bees continue to sulk. They frequently wind up the season with empty combs, and are, therefore, an expense rather than a profit to the yard. I will briefly outline a treatment for loafing colonies, which I have practised with profit for a number of years. First make sure that your colony is really sulking—that is, healthy yet not at work, while all the others are piling in and out with honey and pollen. When assured on the point, set a hive containing empty combs down close beside the hangers out in such a way that the bees will cluster and hang over on the new hive directly over and into the entrance. After a few days, thus cage a young and vigorous laying queen with attendants, and place this cage down between the combs of the new hive at a point where the bees from the loafing colony have taken loafing quarters. If warm, the cage may be shoved into the entrance. After a day or two, give the loafers access to the candy plug in the cage and in due time they will release the confined queen. Watch the colony from the outside; and when you see that the bees have started off to field to a notable extent, make examination of the new colony and note condition. If brood or even eggs are found in a small patch in any of the new combs, all will be well; if found short of honey, give a comb containing sealed honey or feed and close. Let the bees work on for a few days, then gradually move the old colony away so as to force more bees to enter the new hive.

If you desire increase of colonies, change the queen in the old hive at your leisure. If you do not desire increase, dispose of the old queen and after a day or two of queenlessness set the old hive on top of the new one, omitting a zinc honey-board, in order that the young queen may enter the chamber and destroy the queen-cells which may have been started. Replace the honey-board later, and confine the queen to the lower chamber as usual; then, as the brood hatches from the super, honey will take its place. It may be well for me to say that this plan may be used to secure gradual increase without manipulation. I need not point out the saving in labour over some of the plans of increase advocated. It is slow, to be sure, but quite satisfactory in results.—F. L. PRATT, in *Gleanings in Bee Culture*.

It is said that pigs suffering from scours may be helped, and many times cured, by feeding to them a little boiled milk in which has been placed a pint of scorched flour to each gallon of the boiled milk.

When the chickens have a cold, a small piece of camphor should be put in their drinking water, and the same with the laying hens.

Among the Farmers.

THE ASSOCIATIONS DURING THE MONTH.

** * The attention of secretaries of agricultural societies and similar bodies is drawn to this section of the Journal, which has for its object the publication of reports of farmers' meetings, annual reports, presidential addresses, etc.; and it is hoped that full use will be made of the facilities here offered for the dissamination of news regarding such doings of the many associations all over the Province as are likely to prove of general interest to readers of the Journal. In forwarding copies of presidents' reports, etc., correspondents are respectfully requested to make sure that they give the date of the meeting on the occasion of which the address was delivered or report read.*

ON Wednesday, 12th October, the Dundee Agricultural Society held its ninth annual meeting, when the President, Mr. T. P. Smith, read his annual report, as follows:—

PRESIDENT'S REPORT.

I have pleasure in submitting to you the ninth annual report of your Society.

There have been one general, four committee, three sub-committee, and one public meeting under the auspices of your Society held during the year.

The Annual Show was held on the 23rd and 24th of last June, and, I am pleased to say, was, on the whole, very successful. We had an increased number of entries, and again excelled our previous record.

Horses were more numerous, and of better quality than we have ever had, a large number of really good animals being shown.

Poultry was first class, both in numbers and quality: and was most favourably commented on by the judges and others competent to express an opinion.

Dogs made a great advance on anything we have had in the past, and, although this section did not quite come up to our expectations, it was a really good show.

The Chairmen of the Poultry and Kennel Clubs will submit their report to you.

All other sections were well filled, with the exception of manufactures, which was weaker than usual.

You will have noticed that we have made great improvements in the show yard during the past year; substantial and commodious buildings have been erected, to accommodate the poultry and dog sections, and considerable improvements have been made to the horse ring and other parts of the ground.

Your thanks are due to the General Secretary and the Secretary of the Poultry Club, for the untiring manner in which they have carried out their onerous duties.

Your thanks are also due to the Corporation of this Borough for the use of the Council Chamber and other assistance rendered to your Society.

I would like to take this opportunity of recording the Society's great appreciation of the kindness of those gentlemen who so liberally presented special prizes.

The Treasurer will submit his report and financial statement to you.

I wish to again draw your attention to the fact that the number of members is small in comparison to what it ought to be; and the attendance at meetings is also not very satisfactory. These matters deserve your attention. If we are to continue to make satisfactory progress, members must individually and collectively take an active interest in the business of the Society, not only during the Show week, but also at other seasons.

I wish to convey my personal thanks to the General Secretary, the Secretary of the Poultry Club, and other officers of the Society for their services always so freely rendered.

In conclusion, I must again thank you for the honour you did in electing me your President for the past year.

SECRETARY'S REPORT.

The following report was also read by the Secretary:—

I have pleasure in submitting the annual statement of accounts for the year 1909-10. The accounts compare favourably with last year, and it is a matter of congratulation that notwithstanding some very heavy items of expenditure we have to our credit a sum of £23 14s. 6d., which brings our profit and loss account to £300 0s. 9d. The Government grant of £75 has yet to be paid, and when received our position will be improved by that amount.

At the request of the last annual meeting, I visited Durban and Maritzburg for the purpose of collecting special prizes, and as a result of this visit our prizes benefited to the amount of £60.

I would like to point out that the item in the balance sheet sundry creditors, £137 1s. 11d., represents special prizes not yet paid by the donors. In consequence of so much money standing out (the prizes have been paid out to the winners), it has seriously handicapped the Society,

and the committee had to raise a special loan of £15, which must be repaid in about two months' time. If donors could remember to pay their prizes at the Show time, it would save a great deal of clerical work, as well as expense to the Society in the way of interest.

OFFICE-BEARERS FOR 1910-11.

The elections for office-bearers produced the following results:—President, Mr. F. Turtton; Vice-Presidents, Messrs. T. P. Smith, C. T. Vermaak, and A. L. Jansen, and Provincial Council Member for the Division *ex officio*; Secretary and Treasurer, Mr. J. McKenzie (re-elected); Committee, Messrs. G. M. de Waal, B. J. Humann, T. J. Williams, R. Doidge, H. W. Walwyn, W. J. H. Muller, H. J. Head, J. Campbell, D. W. H. Tandy, A. J. Potgieter, D. M. Meuman, Sol. Maritz, A. W. Smallic, N. F. Hesom, G. Buchanan, and L. W. Meyer; Auditors, Messrs. Lyon & Thorrold.

It was decided at the meeting to ask the Mayor of Dundee and the representative of the Division in the Union Parliament to become Patrons of the Society.

FRESH AIR FOR POULTRY.—The observant poultry-keeper who makes his fowls pay not only attends to them at feeding times, but spends a little time during the evening to visit the fowl-houses to ascertain whether the birds have plenty of air. We have frequently gone into people's poultry-houses in the evenings, where the poor hens have their mouths wide open gasping for breath, and their wings hanging down, for a small, low fowl-house in the hot weather, when the fowls are all roosting inside, is like a small stove. It is really cruelty to the fowls to allow them to sleep in that way, and we are sure if poultry people would only take notice, and go in the houses more, they would soon make things more comfortable for the birds, but there are many people who ignore these things altogether. We know some poultry fanciers who have tried the experiment of leaving the fowl-house door open to give the birds plenty of air, and in the morning they have been surprised to find all their birds gone.—(*Farm, Field and Fireside.*)

All young birds need bone-meal and flint dust after they have turned the age of one month. As they grow very quickly, and frequently the young cockerels do not get strength in proportion to size, it is very necessary that bone-forming material should be provided. Good bone-meal and genuine flint dust are not expensive items, and the birds only require a sprinkling in their soft food once a day; therefore, it is well for this item to be remembered by all who want strong, vigorous chickens.

Sidelights.

WHAT OUR EXCHANGES ADVISE.

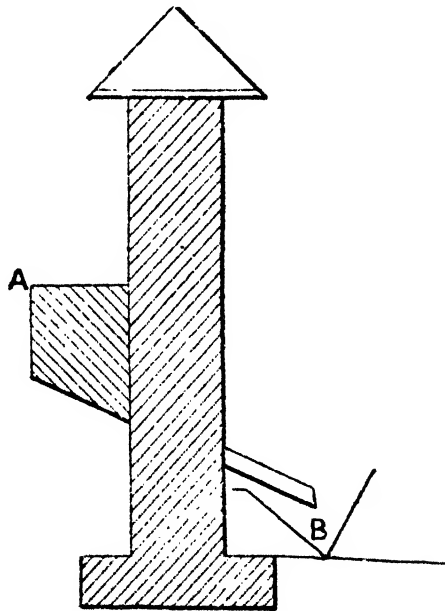
* * *It has often struck us what a quantity of useful information is published every month in our various agricultural contemporaries in reply to enquiries from correspondents, and it has occurred to us that the publication in this Journal each month of the gist of the more interesting and useful of some of these "Replies to Correspondents" may prove valuable to some of our readers. We accordingly make a start in the present issue, and we shall continue so long as we have reason to believe that this new feature of the Journal is appreciated by our readers. We can only afford space for a few notes each month, but we will endeavour always to give the best "tips" that come to our notice.—ED.*

EARLY TRAINING OF HORSES.—Inattention to the small amount of training that a yearling requires is perhaps less than the error of overdoing him, but it is a great mistake to let the young stock run wild entirely. The foal should be handled as early as possible, so that he may grow up fearless, and if a head collar is put on him every now and then he will soon become reconciled to it, the result being that when his education begins his breaker's task will be all the easier. It is extraordinary, however, how the dispositions of foals and yearlings differ; some raise little or no objection to having their ears pulled and legs and feet handled, whilst others resent such liberties bitterly, and by their conduct prove how necessary it is that they should be subjected to the ordeal at a very tender age. When the time comes to halter-break the youngster the golden gift of patience should be exercised by the person in charge of him, especially, as is often the case, when it is found to be a difficult matter to get him to lead. Some are obstinate and others nervous or high-couraged, and others again remarkably docile. All these temperaments have to be met by the breaker with kindness and firmness, for if he is too easy-going with the colt the latter will be irretrievably ruined; while, on the other hand, too much severity may spoil a colt for life.

* * *

ARRANGEMENT OF PIGSTY.—There are several plans of providing for the feeding of pigs without entering the sty; but the best covered troughs are of iron, and the next best of brick and concrete. Wood, even wooden doors, is objectionable, because the timber gets saturated with sloppy pig-food, which undergoes putrefaction and decay, and is

therefore most insanitary. Further, wood cannot be cleaned in the same way that iron can. A "wood pig-cote" presumably means a sty with the sleeping-place constructed of timber, to which there are, of course, many objections; but expense is a consideration, and the coat has to be cut according to the cloth. We may point out, however, that where proper convenience does not exist for pig-keeping, the keeping of pigs is best left alone. Many who complain bitterly of their bad luck suffer loss because they have embarked in a business for which they have not the proper convenience. But a wood pig-cote has probably an open court in front, and need not necessarily have a wooden fence or feeding-trough, and the best plan, if you are constructing a pigsty, is to have the trough built within the wall, and so arranged that the feeder can fill it from without, and at the same time shut off the pigs. The several handbooks dealing with pigs and their management contain numerous drawings of different kinds of pig-troughs, with swinging doors so arranged as to shut off or expose the food as may be desired. Above is a rough sketch



of a cheap wooden contrivance for feeding pigs from the outside, such as you suggest, but it is an extremely primitive arrangement, and, though in common use in some districts, is not to be particularly recommended. The food poured into the chute at A runs into the trough at B.

* * *

RINGING PIGS.—It requires two persons to ring properly—one to catch and hold the pigs, the other to fix the rings. One ring is sufficient

for each pig. The person holding should lift the pig by grasping each fore-leg well up towards the shoulder whilst standing over the pig and facing the same way. Hold firmly, lifting the fore part of the pig off the ground, and holding the hinder quarters gently, but firmly, between the legs of the holder. The pig being now held firmly may easily be rung. Have the ring properly placed in the pincers, take a good hold in the centre of the nose, nip the handles, and the thing is done. This plan of catching and holding may be followed with all pigs that are not too big, but with strong animals two rings should be used for each. The rings may be had in different sizes to suit different-sized pigs. When large pigs are rung they must be roped, slipping the rope already looped, and with the end tied for easy loosing, round the top jaw and through the mouth, drawing it tight behind the tusks in the top jaw. Never ring in-pig animals unless just a day or two after being served, and avoid as much as possible handling animals that are heavy with young.

* * *

STORING WOOL.—A correspondent expressed his intention of storing a quantity of wool, washed and unwashed, in a two-storey thatched house, and he asked what precautions he should take as regards the storage, whether changing the roof from thatch to corrugated iron would be beneficial, and whether a cement or timber floor would suit the better. In reply, he was told that wool as a rule is stored in an airy granary or other good-sized lofty room. The objects to be aimed at are to keep it dry and cool, and so that it will not be injured by moths, will not get dusty, and also be kept away from the light. Before storing, of course, it should be carefully sorted, all dust, straws, sticks, etc., removed, and each fleece properly rolled. Thatch would be likely to harbour moths and be dusty, so that a clean corrugated iron roof, if it could be made quite water-tight and would not "sweat," would be better, but a wooden roof covered with felt would not "sweat." A cement floor would be very suitable, as it would not harbour moth or other insects, and could be swept quite clean.

* * *

GASOLINE ENGINE MATTERS.—The following questions were put to one of our contemporaries:—(1) What is the difference between a direct and an alternating current? (2) What are the four strokes of a gasoline engine, and what is accomplished by each? (3) What is the difference between a primary and a secondary current? The following explanations were given:—(1) Direct current electricity always flows in the same direction. Current which is obtained from a battery is always direct current. Current from some dynamos is alternating—that is, it changes

its direction rapidly, sometimes several hundred times in a second. (2) The four strokes of a gasoline engine are as follows: First, the drawing in of the charge; second, compression; third, power; and fourth, exhaust. (3) The current from any source of current, either a battery or a dynamo, is called a primary current. If this current be passed through a coil of wire which is surrounded by another coil of smaller size and with many more turns it will set up a current in this secondary coil, and such current is known as a secondary or induced current. In the jump spark coil there are two windings. The inner winding consists of a few turns of coarse wire through which the primary current passes. Outside of this there is another coil of fine wire having a larger number of turns or windings, and in this coil there is set up an induced current of high voltage. There is absolutely no electric connection between the two coils.

Everyone who goes in for keeping fowls should keep a terrier, and let him run loose, either in the yard or garden. If that cannot be managed, let him run on a wire stretched near the fowl house. Thieves do not like dogs, as they usually select fairly dark nights when they go to steal poultry.

How long can a fowl live without food? A young cock was discovered, we learn from an exchange—after having been missed for three weeks—wedged in the wooden foundation of a haystack. It was soon all right and crowing lustily after its long fast.

A considerable saving can be effected in the food bill by the utilising of waste table scraps, of which there is a certain amount in every home. There can be no better diet for a laying fowl than household scraps for the early morning meal, and these should be made into a nice crumbly mixture by the addition of a little ground oats or boxings.

Perfect cleanliness with regard to the drinking vessels of the fowls and chickens is necessary. Colds and roup are spread by inattention to this detail more than any other. When fowls and chickens have a cold they generally have a running from their nostrils, and when they are drinking the water is contaminated, and healthy chickens following affected ones frequently contract a bad cold, and this goes all through the stock, and roup powder given does not have the same effect it otherwise would have when the birds are all drinking from these dirty vessels. Every vessel should be carefully scrubbed out each day, and perfectly clean water given. Where rain water has to be used, as is the case in many country places, it should be carefully boiled.

Exchange Reviews.

WHAT OTHERS ARE THINKING AND DOING.

DISCUSSING the feeding of dari, or Kafir corn, *Farm, Field and Fireside* remarks:—The poultry and pigeon worlds have long since adopted dari into their most regular mixtures. The crop is one that requires no more than 10 inches of rain per annum to support it, and we have every anticipation of its increasing cultivation in our hotter and drier Colonies. East Africa, from Nubia to the Zambesi, is capable of producing for us vast quantities of this excellent feeding stuff, which, at 24s. for 480 lbs., is decidedly cheap.

Fertilising Influence of Sunlight.

In February last there appeared a letter in *Nature* signed by A. Howard, Imperial Economic Botanist, India, in which it was pointed out that the custom of exposing the soil to direct sunlight for some time, which obtains in parts of India, for the purpose of increasing its fertility, may possibly have some connection with the experiments of Russell and Hutchinson, which has shown that the partial sterilisation of soil may have some effect in increasing its productiveness. These experiments were dealt with in the editorials of Nos. 202 and 203 of the *Agricultural News*, to which reference is made. Following on the letter mentioned, several have been published subsequently in *Nature* which increase the interest of the subject. In the issue of that journal for March 3rd, 1910, E. J. Russell, one of the experimenters referred to above, supports the view that direct sunlight may have some sterilising influence which increases the productivity of the soil, much in the same way as this is done by the action of heat and antiseptics. This is by reducing the numbers of the larger soil organisms which feed on the bacteria, so that the nitrogen-fixing organisms have the best chance to survive, with the result that they increase largely in numbers and their effect in adding nitrogen is much greater than in unsterilised soil. Further, it is suggested that, as climatic difficulties interfere with the making of experiments in connection with the subject, in England, a series of these should be conducted in India, where circumstances are more favourable.

Another letter, in the issue of *Nature* for March 10, 1910, makes reference to the increase of soil fertility that is generally evidenced where

waste vegetable matter has been burned, and this is followed by another, in the issue of March 24, 1910, drawing attention to the larger crops that are obtained from soil into which steam has been injected for the purpose of destroying various pests.

Returning to the subject of the fertilising influence of sunlight, *Nature* for April 7, 1910, contains a letter from F. Fletcher, of the Bombay Agricultural Department, which suggests that the effect of the sunlight in increasing productiveness is due to the destruction of some toxin contained in the soil. This supposition is dealt with in a letter in the issue of April 28, 1910, in which Russell refers again to the experiments that have been conducted by himself and Dr. Hutchinson, stating that this hypothesis was the first examined by them, but that it was found insufficient to explain the phenomenon. He points out that, as the addition of a watery extract of untreated soil to soil that has been partially sterilised by toluene causes a further increase in fertility and bacterial activity, it is made difficult to maintain that ordinary soils contain toxic substances which reduce the number of the bacteria, and that the effects of sunlight or partial sterilisation is to remove these.—(*Agricultural News*.)

Potato Starch in Germany.

In a report to his Government the United States Vice-Consul-General at Berlin states that potatoes are the principal source of the starch manufactured in Germany, and that potato starch, known as "kartoffelmehl," enters extensively into German export trade. The potatoes are first thoroughly washed and then mashed between rolling cylinders, on the surface of which there are grooves and teeth to tear up the potato cells. The starch is washed out of the ground-up pulp by means of running water. The resulting so-called "starch milk" is first drained through wire or silk screen or through perforated copper plates to remove the cell pulp, after which it is allowed to flow directly into cement settling vats or caves, or it may first be led over small, gently sloping troughs or drains, upon which the purest of the starch then settles. The starch from the settling vats and from the settling drains is refined by being rinsed in stirring vats, and the impurities and cell substances are skimmed or dipped off. The water is then removed by special centrifugal hydro-extractors and the resulting so-called "green starch" is generally worked up into dextrin and sugar. For producing the starch of commerce it must be further dried in specially constructed drying chambers. The potato pulp, or cell stuff, left over is subjected to a renewal of the refining process, or it may be dried and fed to stock.

Salt for Dairy Cows.

Some extensive experiments have been carried out by the Wisconsin Experiment Station to determine the value of salt for milch cows and also the amount of salt that should be given. In every case the cows exhibited an abnormal appetite for salt after having been deprived of it two or three weeks, but in no case did the health of the animal, as shown by the general appearance, the live weight, or the yield of milk, appear to be affected until a much longer time had elapsed. This period of immunity varied with individual cows from less than one month to more than one year.

In every case there was finally reached a condition of low vitality in which a sudden and complete breakdown occurred from which recovery was rapid if salt was supplied. This stage was marked by loss of appetite, a generally haggard appearance, lustreless eyes, a rough coat, and a very rapid decline in both live weight and yield of milk. The breakdown was most likely to occur at calving or immediately after when the system was weakened and the flow of milk large. In general the cows giving the largest amount of milk were the first to show signs of distress. They all suffered less in pasture than when confined to the stable.

The behaviour of the cows in these trials indicates that their food contained sufficient chlorine to maintain them in good health, while dry, for an indefinite period, and it seems probable that, under conditions existing in Wisconsin, a dry cow or steer would suffer no great inconvenience if given no salt except that contained in the normal ration. It is calculated that the ration given in these experiments contained chlorine equivalent to about .75 of an ounce of salt per day, and it is assumed that this is the minimum amount of salt required per 1,000 pounds live weight to sustain an animal that is not producing milk. If this amount is not present in the food, it should be supplied directly. In addition to this a cow should receive enough salt to compensate for the chlorine contained in the milk produced. In general this will require about .6 of an ounce of salt for each 20 pounds of milk given. A slight excess will do no harm, and it is recommended that dairy cows in Wisconsin be given at least 1 ounce of salt per day. Exceptionally heavy milkers will require more than this.

The uniform results obtained with all cows employed in these trials indicate beyond question that in Wisconsin, and in other regions similarly

located, salt in addition to that obtained in the food is absolutely essential to the continued health of a dairy cow while producing milk. It is evident, moreover, that the amount of salt which must be supplied directly will vary greatly in different localities, it being more at high elevations and at places remote from the sea.

More about Chou Moellier.

Some months ago we made several references in the *Journal* to a new—or rather, re-discovered—fodder plant, called Chou Moellier, which had been attracting attention in Australia. Our references resulted in enquiries from some of our readers, and we placed them in communication with Australian seed merchants. In the September, 1910, number of the *New South Wales Agricultural Gazette*, Mr. A. J. Pinn, the Experimentalist at Hawkesbury Agricultural College, contributes a note on this plant which may be of interest to some of our readers. He says:—This fodder-plant, which has recently been brought into prominence, is by no means new, as mention is made of it in Morton's "Cyclopædia of Agriculture," published in 1875. It belongs to the kale or borecole family of plants, and is characterised by its thick, tall stems and large succulent leaves. The crop grown at this College was sown in drills on the 16th June, 1909, and, although the summer of this year was very dry, the plants withstood the severe weather conditions without the application of water. Rain fell at the latter end of December, and caused a rapid growth of the plants, which at present (one year after planting) are 5 feet high, and still growing. During the month of June a small area was harvested, producing a yield of 27 tons 17 cwt. of foliage per acre, and, in addition, 38 tons 18 cwt. per acre of stems.

The best soil for its growth is a warm sandy loam, preferably one that has received an application of stable manure the previous season. The seed may either be sown in drills and eventually thinned out, or the plants raised in a seed-bed and transplanted into rows 3 feet apart and 2 feet between the plants. On account of the seed being expensive, *viz.*, 5s. per lb., the latter method is recommended. When planted by these methods the cultivator can be used to keep down weeds until the plant becomes sufficiently advanced to need no further cleaning. If several cuttings of the foliage are required, the large leaves should be pulled from the stem, leaving the younger ones to develop and be of use at a later period. The practice of allowing the crop to remain for more than one season is not recommended. After one year's growth the plants

attain a height of 5 to 7 feet, and only a comparatively small amount of leaf is formed at the top. The crop is especially valuable for poultry, as well as for all classes of stock. Feeding tests at this College have demonstrated that the foliage is relished by all stock, but the stems are eaten by pigs only. Besides its value as stock-food, it is also eaten as a vegetable, but only the younger leaves can be used. When prepared for the table it presents a dark-green colour, and possesses a fuller flavour than cabbage. Although producing a good quantity of feed per acre, it does not possess any special qualifications which would warrant the recommendation of this particular variety before Jersey Tree, or Thousand-headed Kale.

Science and the Farmer.

NOTES OF INTEREST BY FARMING EXPERTS.

THE proper time to plough land is when it is just moist enough to break up mellow, neither wet enough to leave a slick surface when rubbed by the mouldboard nor dry enough to break up in large clods; or, as the southern farmer puts it, when the soil has a good season in it. If continued rain follows wet ploughing, little harm follows; but hot, dry winds would soon leave only a mass of unmanageable clods.—W. J. SPILLMAN, *Agriculturist in Charge of Farm Management Investigations, U.S. Bureau of Plant Industry.*

CLEAN CULTIVATION.

Any piece of ground denuded of its natural covering of vegetation, and so exposed continually to the burning heat of a sub-tropical sun, rapidly loses most of its fertility and becomes dead, lifeless and useless. The soil must not be regarded only as a place for roots to grow and live in, it must be looked upon as Nature's food-producing laboratory, in which multitudes of micro-organisms, or bacteria, are busily engaged in preparing food for the plants which grow in it. They fail utterly in the performance of their work if their natural element, a soil rich in humus, is by some means converted into a sandbank. This is exactly the result of long-continued, clean cultivation.—H. HAROLD HUME (*"Citrus Fruits and Their Culture"*).

VIGOROUS BREEDING STOCK IN POULTRY.

To be successful in raising chickens it is necessary to have healthy and vigorous breeding stock, for the lack of vigour in the newly-hatched chicks is often traceable to weak parents. Only the most vigorous and

the best grown birds should be put in the breeding yards. Each bird should be full of life and energy and free from any serious deformity. Yearling hens are usually better than pullets for breeders for the reason that the hens are more mature and do not lay so many eggs during the early winter, and consequently do not reduce their vitality so much before the breeding season. Vigorous hens 2 to 4 years old can often be advantageously retained in the breeding yard. The male bird chosen should be young and active. An early hatched well-developed cockerel is usually satisfactory, or a good vigorous yearling or two-year-old cock may be chosen. The hens used for breeding purposes should be given the best possible care; they should be provided with large runs and should not be forced for heavy egg-production during the early winter.—G. ARTHUR BELL, *Assistant Animal Husbandman, U.S. Bureau of Animal Industry.*

CATCHING TURKEYS FOR KILLING.

Beginners, especially, have much difficulty in securing their turkeys when they desire to kill and market them. A bungling and unsuccessful attempt to catch a flock may make them so suspicious that they cannot be surrounded or approached the remainder of the season. Repeated attempts to catch them increases their wildness, and frequently the only way to secure them has been to shoot them. This is more apt to be the case if the stock contains wild blood. Old hands at the business have learned by experience the proper course to pursue. The usual plan is to get the birds into a barn or carriage shed and shut them in. In order to do this they are fed for a long time in front or just within the place in which they are to be caught. Later, the feed is placed within the building, and they become so familiar with it that they are unsuspicious when within. The feeder takes pains not to appear to notice or watch them, and moves about very slowly and quietly. When they are caught, the doors of the building are suddenly closed, or a covered yard of wire netting is built in front of the building and closed when all are in.—HERBERT MYRICK (*"Turkeys and How to Grow Them"*).

BEST TIME TO KILL WEEDS.

The best time to kill weeds is just as the seeds are germinating, or while they are yet very small. When this is done, but little moisture is lost through them, and they render but little plant food insoluble. In the thorough and early preparation of the seed-bed many weeds are destroyed by killing them just as they are coming up. So, too, in the case of a grain field, which is rolled after being seeded, and is then harrowed; the rolling hastens the germination of the weed seeds, and the harrowing then throws them out into a dry soil, which kills them. If such a field

is again harrowed just after the grain is up, a second crop of weeds may be destroyed, and the yield made greater as a consequence. In the case of potatoes and maize it is very easy to destroy at least two crops of weeds before the maize or potatoes are large enough to cultivate, by harrowing before and just after the plants are up. This is very important, because it not only saves plant food for the crop, but it can be done so much more cheaply and rapidly with the broad light harrows and weeders than it can later with the cultivator.—F. H. KING (*"Agricultural Gazette"*).

RETENTIVENESS OF THE SOIL.

— The amount of water which a soil is capable of holding depends directly upon the fineness of its particles. Then that plough which will break and pulverise the soil most thoroughly is the one best adapted to fit the soil for holding moisture. This point is well illustrated by King in "The Soil." He says: "Since each independent soil grain of a moist soil is more or less completely surrounded by a film of water, it is evident that, other conditions being present, the largest aggregate surface area may retain the most water per cubic foot. Now, a cubic foot of marbles one inch in diameter possesses an aggregate surface of 27.7 square feet, while if the marbles were reduced in diameter to one-thousandth of an inch, then the total area per cubic foot is increased to 37,700 square feet. From this it is evident that the total amount of water capable of being absorbed by a soil which is cloddy and lumpy is very slight in comparison with what it would be were it in a finely divided state; and not only is its absorbing power less, but its power of holding moisture is also greatly reduced.—L. H. BAILEY (*"The Principles of Fruit Growing"*).

"WATER WITCHERY."

Ever since the writer can remember he has been conversant with the methods of certain men who claim to possess the occult power of locating a stratum or underflow of water by means of a forked stick, held in such a way that it is expected to dip at a point over the underlying waters as the operator passes along on the surface. This is called "water witchery," and is at best a very problematical practice, scarcely worth the time that one might devote to it, and certainly not always worth the fees that may be charged. The way to put a water locator of this sort to a practical test is to place stakes at the points where his forked willow may show the downward tendency, indicative, as he will say, of the water underneath. Let several stakes be driven at different points. Then blindfold the water prospector, lead him around in a circle several times, and if his magic wand will repeat the dipping actions as before, and the two sets of stakes agree, some dependence may then be placed in the

operation, but the test will be more apt to fail and the deception will at once be apparent.—LUTE WILCOX (*"Irrigation Farming"*).

GOOD BUTTER POINTS.

The points to look for in good butter are:—

(1) **Texture.**—When cut half through, and then broken, should produce a distinct fracture, and show a close granular texture.

(2) **Moisture.**—When pressed by a wooden hand, should appear free from large drops of water; that present should be in a very finely divided state. There should be no milky appearance.

(3) **Flavour.**—Sweet and nutty, free from oiliness, acidity, etc. Salt evenly distributed throughout.

(4) **Aroma.**—Sweet and characteristic of good butter.

(5) **Colour.**—Even all through, and of a tinge pleasing to the eye.

(6) **General appearance.**—Nicely made up, and of an appetising appearance.

(7) **Keeping qualities.**—Should keep for some time before beginning to change. A good sample of farm butter should keep a week or ten days in summer before showing any signs of changing; in winter two, or even three weeks. Butter should always be stored in a cool place free from contaminating influences. If kept near foods such as meat, game, cheese, onions, etc., or in a bad atmosphere, it readily absorbs the odours prevalent.

A good cow should produce at least 250 lb. of butter during the year. Cows that produce less than this are best not retained in the herd where butter only is produced.—TISDALE AND ROBINSON (*"Butter-Making on the Farm"*).

NEED FOR EXERCISE.

The exercise which an animal takes causes a corresponding amount of waste food. By exercise the respirations are not only rendered more frequent, but are also increased in force; hence there is a greater consumption of carbon—that is, of starch and sugar, the elements of respiration and fat—consequently the animal requires a larger amount of food to enable it to fatten, or if this is withheld, it becomes wasted or leaner. It is well known that fattening animals become more rapidly fat when kept perfectly quiet, and free from anything which excites their attention and renders them restless. The growing animal, indeed, requires a certain amount of exercise to promote muscular development and strength of constitution. If sufficient exercise is prevented in this case, the young animal will, no doubt, accumulate fat freely, but its constitution will be enfeebled; and if the same treatment is pursued through several successive generations, although the animals will gradually acquire a

greater aptitude to fatten at an early age, they will also become less to be relied upon for breeding purposes. Growing and breeding animals should therefore be always permitted a sufficient amount of exercise to secure a healthy system, whilst those which are fattening for the butcher must be kept quiet and undisturbed.—ROBERT OLIPHANT PRINGLE (*"Live Stock of the Farm"*).

The Position of East Coast Fever.

OUTBREAKS DURING SEPTEMBER-OCTOBER.

The Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st September to 20th October:—

Dundee Division.—Outbreaks on the farms "Northfield," "Grimstone" (sub-division of "Stanmore"), "Padda Vlei," west of line, "Prestwick," west of line and north of Dundee-Vryheid line.

Stewart Division.—Outbreaks on the farms "Oburn" (shown on map as "Haasfontein"), "Doornkop," "Chieveley."

New Hanover Division.—Outbreaks on the farms "Singletree" (sub-division of "Boilingfontein"), "Camin" (sub-division of "Waterfall").

Isopo Division.—Outbreaks on the farms "Gracourt," "Bahukard" (marked on map as "Harper Lot 9a").

Lower Umzimkulu Division.—Outbreaks on the farms "Coniston" (adjoining the farms "Eden," "The Patch," and "Patwa's Location"), "Lot 34," "Beedale."

Ladysmith Division.—Outbreaks on the farms "Kirkentullock," west of line; "Rietfontein," west of line.

Bergville Division.—Outbreaks on the farms "Riet Vallei," "South Dalton."

Impendhle Division.—Outbreaks on the farms "Craighead" (marked on map as "G. Holgate"), "Isabayo," "Smithfield."

Polela Division.—Outbreak on the farm "Bulwer Town Lands."

Richmond Division.—Outbreaks on the farms "Cragielea" (sub-division of "Java Heights"), "Lots 16-21" (inclusive) of "Byrne," "Lots 8-13-14" of "Kruisfontein," "Franby" (adjoining Tolonko's Location), "Poldhu" (5 of "Wondergeluk").

Alexandra Division.—Outbreaks on the farms "Hlokozi Reserve," "Lot E. J."

Weenen Division.—Outbreak on the farm "Block 7" (Old Settlement).

Lion's River Division.—Outbreaks on the farm "Corrie Lynn" (sub-division of "Hebron," "Aird," and "Petrusstroom").

Correspondence.

THE "ZIBIBA" SNAKE BITE ANTIDOTE.

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TO THE EDITOR OF THE "AGRICULTURAL JOURNAL."

DEAR SIR,—I enclose a cutting from the local paper here which is an account of experiments I made with an alleged snake bite antidote known as "Zibiba." As the farming community are firm believers in this substance, perhaps it would be of interest to reprint the enclosed in your *Journal*.—Yours, etc.,

F. W. FITZSIMONS,
Director, Port Elizabeth Museum.

Port Elizabeth.

The following is the cutting referred to:—

In South Africa, particularly in the Transvaal, Swaziland, Zululand, and Natal, there is an alleged native remedy for snake bite known by the native name of "Zibiba" or "Sebiba." This cure is, according to the "native doctors," an infallible remedy for snake bite. Natives have absolute faith in their doctors. These doctors claim this substance to be an antidote, therefore in consequence the same belief is held by the native population. Large numbers of Colonists also have unquestioning faith in this efficacy.

A certain well-known South African journal at Capetown, in a leading article on "Zibiba," voices the public belief in this substance as follows:—"We have been assured by Native Commissioners, and other men of position in the Transvaal, that they have personally witnessed marvellous cures worked by this substance. A very small quantity, as much as will cover the point of an ordinary pen-knife, taken internally, and a little of it rubbed into the wound and into small incisions on the wounded limb above the wound, has been known to restore the bitten man to complete convalescence within 24 hours, after his condition had been so precarious that he had already become unconscious, and also blind from the consequences of a Puff Adder's bite. Other unquestionable evidence could, if necessary, be adduced to bear out the assertion that "Zibiba," of whatever it may consist, is not a mere palliative, but a sure and indubitable cure for snake bites. From what plant or substance "Zibiba" is prepared by the native doctors, is as yet a secret which they have managed strictly to preserve.

F. W. Reitz, Esq., former State Secretary of the Transvaal, who takes a keen interest in the quest for a reliable snake bite antidote, other

than serum, sent me a phial of this "Zibiba," to enable me to carry out a series of experiments. This "Zibiba," on examination through a microscope, appears to be the root of a plant. The root is finely pulverised, and is a reddish, sandy shade in colour.

Realising the unsatisfactory nature of experiments of this kind on small creatures such as rats, guinea pigs, rabbits, etc., I procured a large male Vervet monkey (*Cercocebus pygerythrus*) in the fullest vigour and health. Mixing a heaping egg-spoonful of "Zibiba" with a piece of banana, I gave it to the monkey. After an interval of 15 minutes, a brown Cape Cobra or Bruin Kapell (*Naja flava*) bit the animal on the tail, one foot from the root, on a spot previously shaved. Within one minute the site of the bite was scarified thoroughly, and "Zibiba" powder rubbed in. Other incisions were made between the site of the bite and the heart, and more "Zibiba" was rubbed in. After an interval of two minutes, more of the remedy was applied to the incisions. Each incision was smothered with it. As is usual in cases of bites from cobras, the animal did not suffer any pain. The only pain was a momentary twinge when the rapid incisions in the skin were made with a sharp lancet. The animal did not show the least sign of any inconvenience for 15 minutes. Then a sudden drowsiness seized it. This was due to the paralysing action of the cobra venom on the nerve-centres. This increased progressively until the animal became unconscious, and died in 40 minutes. After breathing ceased, the heart beat vigorously for five minutes, then gradually slowed, and stopped after another two minutes. This is not unusual in cases of death from cobra venom. It has always occurred in my experience, hence the reason I so strongly advocate, in the "Snakes of South Africa, their Venom, and the Treatment of Snake Bite," the adoption of artificial respiration methods, if breathing should cease suddenly. On dissection, it was clearly evident the animal had died of cobra venom poisoning, and not from any possible toxic action of the "Zibiba." Subsequent experiments of a conclusive nature have confirmed the negative results of the first case. It is unnecessary to give them in detail.

So it seems, after all, the confidence of the Colonists has been misplaced, and the native population as well. "Zibiba," which, since the advent of the white man to South Africa, has been regarded as an absolute cure for snake bite, has been shown to belong to those many popular cures which have failed utterly when tested under proper conditions. Personally, I am in no way prejudiced in favour or against any alleged remedy. Rightly or wrongly, I think it is a duty to test these alleged snake bite cures. It is a pity that it should be necessary that living creatures should have to be sacrificed that we may be in a position to prove conclusively whether snake bite "cures" are genuine or not. However, there is no other way we know of. Provided experiments are

conducted as humanely as possible, the end, I think, more than justifies the means. In this case thousands of Colonists, and tens of thousands of natives, if not millions, have absolute faith in the antidotal properties of "Zibiba." The inevitable result is that, instead of approved remedies, such, for instance, as those mentioned in the above-named book, being applied, this worthless "Zibiba" is administered by the victim's friends, a native "doctor," or applied by himself. No other treatment is thought to be necessary. Thus valuable human lives are lost—lives which could easily be saved.

As far as I can ascertain, this "Zibiba" contains no medicinal substance which is of a nature to be rapidly absorbed by the mucous membrane of the stomach or the absorbent vessels under the skin. When mixed with snake venom, it does not destroy its poisonous properties. If it hasn't this effect outside the body, it wouldn't be likely to have the contrary effect within the body.

If people would only make themselves acquainted with the nature of snake venom, approved antidotes, the treatment of snake bite, the degree of venom of each species, how to distinguish venomous from slightly venomous or non-venomous snakes, fewer deaths would take place amongst human beings and stock from snake bite. In addition the almost universal fear and dread of snakes would be much lessened. So strong is this dread of snakes and their venom, that many cases are on record of people collapsing and dying after being bitten by non-venomous snakes. I have not actually seen cases of people dying, but I have seen them in a state of great nervous collapse, simply through fear and dread induced by the firm belief that death was likely to occur.

ZIBIBA.

This substance, I am informed, goes under various names. Large numbers of Colonists keep it as a remedy in case of snake bite, and simply know it as "Kafir mooti." The Kafir doctors take every precaution to prevent its nature being discovered. A farmer says he offered two head of cattle to a Kafir "doctor" to tell him what plant it was, but he refused. He said he wouldn't do so for a span of oxen and a wagon.

Chickens are often cooped on grass, where they cannot get a particle of sharp grit; and others are penned up in back yards, where all the sharp grit has been extracted from the ground. It is very essential that chickens should have sharp grit, as this is the only method by which they can digest their food. When chickens have to be kept on for stock birds, it makes a difference more or less.

THE FARMER BOYS' PAGES.

Conducted by "ARATOR."

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS



AND NATURE STUDY NOTES

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Nature Study Notes for November.

IN the orchard the guava blossom is out and the amatungulu hedges are laden with white stars as though it had been snow. Beautiful new leaves have come on the mango trees, warm sepia coloured leaves, dark and shady. With but few exceptions, all the trees have donned their fresh leaves; the bush wears a robe of darker, richer green.

Seedlings jostle each other for standing room, everywhere the rate of growth is marvellous, the contest keen. Bamboos and tree ferns, cycads and palms enter the race, even the weeds compete, lengthening nearly a foot over-night. Like a lithe green snake the cactus plant creeps to the furthest branch of the mimosa tree, the passion flowers with nimble fingers swing themselves upward, the supple stems of the other climbers twist this way and that, through branch after branch, till there is only the blue sky overhead. Tiny short-lived flowers hide in each green recess, and leaves take all strange shapes, here broad as a Zulu warrior's shield, there long, thin narrow blades, sharp-pointed as his spear. Green boughs press close on every side. We are the little people of the Kafir legend who were lost in the green hill and re-read with deeper meaning the true story of Jack and the Beanstalk.

The seedlings are not alone in having started life on their own account. Tiny spiders have crept from their yellow cradles and escaped. The Mantis family have left their silken cocoon hanging empty on the fir tree, while baby lizards, just out of the egg, slip out and in among the stones.

The swallows are back. On the telegraph wire they parted with hundreds of fellow-voyagers just returned from oversea. Their old nest is down, but they like the site and intend to rebuild. From early morning to the last thread of light we hear their familiar "*tweet, tweet, tweet.*"

M. R.

The Country over the Hills.

The Ideal of our Nature-Study is by means of its revelation of the wonder and the mystery of Life to deepen our wonder in the world, our love of beauty and our joy in living.

Yes, there are the hills, away, away in the west, the sun just sinking behind them, outlining their lovely slopes and showing up the great gap, out of which our own dear river comes.

I wonder which we love more, the hills or the river? The river, I think, for it is our playfellow, our own familiar friend, running right

through our daily haunts, carrying us on its bosom when we are going to visit the outside world away from our quiet little nook, and telling us wonderful stories of all it knows and the secrets it holds. Sympathising with all our moods, smiling, frowning, caressing, scolding, whispering words of love or roaring passionate threats after a big storm up in the hills.

We are a happy company, "the schoolroom party." We are asked if it is not dull, miles away from neighbours, in the heart of the bush at the back of beyond.

People who ask this have not had their eyes touched with the magic ointment; they do not know what it is to have our river make love to them; or to climb to the top of the hill at the back of the house and drink deep intoxicating draughts of sweet-scented, delicious air blowing up from the sea sixty miles away; or to stand at the courtyard gate at night under the star-spangled heavens and listen, listen, listen to all the weird and wonderful bush sounds until it is almost impossible to believe this is only our everyday world with worries about household trifles such as bread-making and washing and not that fairyland of our childhood, where everyone lives "happy ever after."

Dull!—poor people—what do they know of Nature, the most fascinating, winning, beautiful, restful, soothing, soul-entrancing Mother waiting with open arms to welcome her children; to smile on them and help them on their way or to kiss the place and make it well when they have been hurt by the rough work-a-day world.

"The schoolroom party." You may think an invitation to join this a light matter. Mistaken, deluded mortal, this honour is reserved only for the chosen few who have been closely scrutinised and have proved themselves worthy. You must be able to ride, swim, row and climb, must love all animals, flowers and living things and must have—whatever your age—the heart of a little child.

Let me tell you about some of the members. First and foremost there is our House Mother. I wish you could know her: always where she is most wanted, never thinking of herself, ever ready with a helping hand, busy from morning till night caring for everyone around. Our little colony turns to her for sympathy in all its troubles, whether illness or sorrow. Her exquisite paintings of our wild flowers are a never ceasing pleasure to us all.

Then the Master, with his lovely rose-garden, where he spends his leisure hours, and his wonderful folk-lore. After the day's work is over to sit on the edge of the verandah looking up into the deep blue of the night-sky and listening to his rich, musical tones telling the legends of the land, weaves the magical spell of the bush closer and closer around the land, weaves the magical spell of the bush closer and closer around us.

Shall I tell next of our sweet Girl just blooming into womanhood; with her winsome ways, dainty manners, graceful charm and loveableness: we could never do without *her*—she has wound herself around all our hearts.

Our Girl left us and went out into the big world for a time, but she has come back and the river still whispers its secrets into her ears, the ointment is still potent on her eyes, and she is still our very own Girl with a wider outlook on life. She and the Son of the House are together learning the old old story Mother Nature teaches her favoured children.

What an idyll it is! The grand, old gum trees stretch out their branches, the little birds flutter around, the bush-buck with their soft, gentle eyes crop the sweet grass, the crickets sing and the river—but I could never tell all the river says, it knows too much. It has such lovely little rocks and shady reaches just made for lovers.

Now our youngest member, the smallest but by no means the least, the Boy. He is founder, leader and king of the "schoolroom party," and no one is admitted to it without being proposed, seconded and unanimously voted for by the Boy. He is nearer the heart of things than any of us; he knows what the little fish we see in the clear pools are doing; he can tell us where the birds are building their nests, the exact spot we shall find the first flowering orchid, and hundreds of really important things of which we silly grown-ups have no notion.

These are a few of the many dear delights in that wonderful country over the hills, which land anyone can find for themselves wherever they live, if they use the magic ointment.

J. W.

The Appeal of South Africa to the Imagination.

I was sitting up on Signal Hill at Sunset. The wind had been blowing all the day, and even then had not really died away; but the great silence that comes with the night was falling over the town. The hills away on the horizon were purple against the brilliant sky, and as the shadows began to creep over the veld, they seemed full of the spirits of those old people who must have passed stealthily, almost as quickly as the shadows, when they hunted the wild animals, or each other over the same land.

Down on the flat were strange dust shapes, made by the last fretful swirls of wind, which formed themselves into the fantastic figures in a war-dance. All the air was full of the wild frenzy of the old warriors, the cruel animal-like people who maddened themselves in this way before battle, and they swayed backwards and forwards, from side to side, till I could almost see the quick movements of their lithe, active bodies.

Then as the light grew less, the warriors passed away, and I was left alone in the silence which was full of echoes. But across the hill came a man. He, too, was a warrior, wounded, I could see, for he travelled slowly, with difficulty over the place where his comrades had been a short time before. He gazed eagerly forward and pressed on, striving to overtake them in their swift flight, for the loneliness of the veld was upon him, and he was afraid. But before he had gone many paces, another shadow sprang on him from the side of the hill, and the great lion and his prey vanished as the other hunters had vanished, and there was silence again.

And the ghosts of new men began to appear, who burnt the long grass, so that the dark warriors might not hide in it; who drove away the wild animals, and who forced the wild people to fight their last battle on the old ground. And so the hill began to echo new sounds, to look down upon new races.

Across the quiet veld they made new paths of steel: and the people from lands old in history took possession of this land with no history save that which is buried beneath its soil.

With the coming of the white man, it became a country known to be good for farming, famous, in parts, for its scenery and its flowers, and rich in minerals. It has yet another great treasure, for thousands have come to seek, and have found, good health, strength of mind and body, on the dry windy plains of the High Veld.

But as yet Africans have given little to the great treasures of knowledge and of art, to which the nations have been adding century by century. In their methods of gold-mining they are in advance of others. They know more about cattle diseases than most people, but there have been no great artists, no great musicians, no great thinkers that Africa can call her own.

And so, surely, as one looks out across the wide free space of its great expanse, the shadows come of these whose thoughts will be wide and broad and vigorous, patient and strong, because they have learnt to know the soul of Africa, of those who will picture her gorgeous sunsets, with all the power and genius which is due to them; and of those who will put all her age and loneliness, all her breath and patience, all her mystery and desolation into the music they will hear (and then write) in her wind or in the silence of her sleep under the quiet stars.

The shadows of men fade as in time the great Continent, herself a shadow in Eternity, will fade; but her teaching will live forever (if she will teach her true best) in the souls of her children she has influenced, even when there is a new heaven and a new earth and the old things have passed away.

K. RAMSBOTTOM,

St. Michel's School, Bloemfontein.

Spring Studies.

II.—THE YOUNG PLANT AND HOW IT GROWS.

THE eagle stirreth up her nest that the young ones may take flight, the spider casts her little ones adrift and dares them to return. The swallows teach their little ones to fly. First they coax and encourage them, but if the fledglings are timid, they become impatient and push them from the nest. The old bees swarm to a new hive and leave the young ones to make a home of their own.

In the same way there comes a time when the little seedling must rely on its own resources. The food supply with which it started is exhausted, it must begin life on its own account. Meantime it has established relations with the world around it, with the soil and with the sunshine, and from these in future it must draw its food supply.

To do this each little plantlet is provided with root, stem and leaves. The root, by means of its tiny root-hairs, takes up moisture and mineral salts from the soil, which pass up through the woody part of the stem through the veins to the leaves. The leaves in turn, by means of their green-colouring matter, obtain carbon from the atmosphere and pass down their manufactured products through the stem.

Plants grow most *in the spring*. It is easy now to strip the bark off a stem and leave the white wood bare. This, because it is separated from the wood by a ring of growing tissue which breaks easily, being young and tender. In spring this soft tissue gives rise to an additional layer of new bast tissue inside the old bark and new wood tissue outside the old wood, and thus the stems grows thicker year by year.

Mark a few growing shoots after the rain and watch the result. Note how much the creepers lengthen in a week, measure a seedling bean after twenty-four hours, or the leaves of the water-lilies after an hour's rapid growth. Notice how quickly the cycads, palms, and tree-ferns put out their new crowns. If growth continued at this rate the cycads and palms would overshadow the house and the bamboos sweep the sky! But they grow slower and slower as they grow up.

Like people, plants grow most *when they are young*. Most children of three years are half as tall as they will ever be! All plants do not grow alike, of course; some grow slow, some fast. Fast growing shoots have usually a limp, transparent appearance. It takes the work of the summer days that follow to build them up into strong, firm stems and branches.

Plants grow most *during the night*. Through the day they are rapidly transpiring and losing the water taken up by their roots. Notice

the sunflowers and pumpkins, for instance, on a very hot day, how the sun has taken all the moisture and the leaves droop with thirst. At night there is no sun to take all the moisture and the plants grow.

The Principles of Manuring.

VIII.—GUANO.

WE can now go on to consider the most important of the various "artificial" manures that are used in farming. Those that we shall consider are: Guano, Nitrate of Soda, Sulphate of Ammonia, Bones, Mineral Phosphates, Superphosphates, Basic Slag, Sulphate of Potash, and Muriate of Potash. We will not linger long over the consideration of these various artificial or commercial fertilisers, but will just give sufficient attention to them to enable the beginner to understand what their respective manuring value is.

GUANO.

Guano is not used nowadays to the same large extent as it was made use of formerly, but it enjoys the distinction of being the first artificial manure to be used in large quantities, and consequently it is fitting that we should give it first consideration in our study.

The value of guano as a manure lies in the nitrogen phosphates and potash which it contains. There are, however, several kinds of guano in which nitrogen or phosphoric acid predominates, and these are known accordingly as nitrogenous and phosphatic guanos. Owing to the fact that it contains proportions of all three of the principal fertilising constituents, guano comes next to farm yard manure as a general manure.

Guano consists almost entirely of the excrements of sea birds as well as to some extent of the remains of birds themselves and of various animals, such as walrus, seals, etc. The principal guano deposits so far discovered are those in Peru, and others have been found in North America, West Indies, Australia, Asia, Africa, and some of the Pacific Islands.

Guano resembles farmyard manure in this respect that it is applicable to all kinds of crops and may be used on all kinds of soils; and as in farmyard manure its manurial constituents occur in a state of intimate mixture, which fact places it above any mixture of ordinary commercial fertilisers even though containing the same fertilising constituents in the same proportions.

To secure the best distribution of guano in applying it to the land, and also to prevent any risk of loss of the ammonia which it contains, it

should be mixed with dry earth, ashes or sand, or some other substance (but not with lime). It should be applied in the spring, either just before or at the same time as seeding; from 1 to 4 cwt. per acre is the usual dressing, according to the nature of the crop and whether the guano is nitrogenous or phosphatic. Whilst we are on a subject of guano, mention should be made of the so-called "guanos" made from fish, flesh, etc. Fish, meat, refuse, etc., is now manufactured into manure containing often as much as 10 per cent. of nitrogen, and phosphatic acid ranging from 4 to 15 per cent. Guano manufactured from the carcasses of whales contains from 7 to 9 per cent. of nitrogen and about 12 to 13 per cent. of phosphoric acid. Fish guano is of undoubted value as a manure, but its value is detracted from to a certain extent by the oil which it contains and which retards the fermentation of the manure. On account of this difficulty fish guano should be applied to the soil some time before the crop is planted. Meat-meal guano is as a rule made from the refuse of carcasses of cattle after they have been treated for their meat extract. The nitrogen content varies from 4 to 8 per cent. and the phosphoric acid from 13 to 20 per cent. In some parts of the world the carcasses of animals that have died of disease are manufactured into manure, the proportion of nitrogen in which runs from 6 to 10 per cent. and of phosphoric acid from 6 to 11 per cent.; meat-meal guano ferments more quickly than fish guano and is a more valuable manure.

A few words in conclusion as to pigeon and fowl dung. At one time pigeon dung was prized as a fertilizer, but it is now known to be by no means a rich manure since its nitrogen and phosphoric acid do not exceed 3 per cent. respectively and it contains but a little of the percent. of potash. Fowl dung also is not a rich manure according to analyses, as it contains from 0.8 to 2 per cent. of phosphoric acid and less than 1 per cent. of potash. The droppings of ducks and geese are even poorer.

(To be continued.)

Nature Study in South Africa.

"Learning is in the schools, but Wisdom crieth out of doors."

THE energy and enthusiasm with which Nature-study has been taken up in other lands—in face of climatic and other difficulties and a place made for it in an already overcrowded curriculum, promises well for its reception in South Africa. In this sunny land open-air lessons are sure to be a source of interest and delight to teacher and scholar alike.

In Nature-study the analytical study of dead form is replaced by a synthetic view of *living* Nature. In the past biology has been very much the dissection of dried specimens, the words botany and zoology

synonymous with all that was dull and uninteresting, but all this is changed when we see our plants no longer separated, isolated, that is dead things to be dissected and destroyed, but in their environment, to be tended and cared for alive.

To catch butterflies and pull flowers to pieces is not Science but wanton destruction. The poison-bottle may well be left to the necrologist, the secrets of the charnel house are no secrets for children. And after all there is no need to destroy. The little buds will unpack themselves, the flowers will expand, the seed-boxes open of their own accord if we be but patient and wait.

The main scientific interest of the plant no longer centres round the form alone. We learn, for instance, how soils may be fertilised by the aid of bacteria, wheat yields multiplied by artificial pollination and food supplies produced undreamt of by the followers of Malthus, how from the wayside weed the florist evolves the coveted blossom and the hard-skinned, stony peach grows luscious to the core.

And just as the herbarium of dead plants—of pressed specimens—is readily neglected for the garden of growing ones, so is the museum of dead things forgotten in the pleasure, for example, of opening a beehive, and “seeing how the wheels go round.”

Suggestions regarding School Gardens.

A Circular (No. 746) has recently been issued by the Board of Education, England, containing suggestions for teachers in relation to the subject of school gardening. One of the most valuable parts of the circular is a series of questions which the teacher should ask himself periodically, in order that he may be able to satisfy himself as to the thoroughness and efficiency of the gardening work and the garden as means of education. In view of the increasing interest which is being manifested in Natal in regard to Nature-study and primary agricultural education, we reproduce the questions below :—

- (1) Is the position of the garden satisfactory?
- (2) Is the land sufficient in area for serious practical work?
- (3) Are the tools suitable and sufficient in number?
- (4) Are the tools properly kept?
- (5) Are the vegetables grown suitable to the district, and sufficiently various to teach the ordinary operations of cottage gardening?
- (6) Is the system of cropping satisfactory?
- (7) Is a sufficient quantity and variety of manure used?
- (8) Is fruit culture included?
- (9) Are flower culture and bee-keeping included?

- (10) Is the gardening time-table satisfactory?
- (11) Does each scholar work from a scale drawing of the proposed cultivation of his plot made by him beforehand?
- (12) Are the manual operations properly taught?
- (13) Is the garden, as a whole, kept in good order?
- (14) Do the scholars make notes of their garden work?
- (15) Is close and accurate observation insisted on?
- (16) Is gardening correlated with Nature-study?
- (17) Is gardening correlated with drawing?
- (18) Is gardening correlated with arithmetic?
- (19) Is gardening correlated with reading and composition?
- (20) Are the first, second, and third years' courses of work progressive?
- (21) Is the disposition of the produce satisfactory?
- (23) Is co-operation taught?
- (22) Are seeds saved?
- (24) Is the instruction adapted for girls?

The Chameleon.

The chameleon is a very funny little animal. It is green, so that it cannot be seen if it is being looked for. If we put a chameleon when it is young on a coloured cloth it will change to the colour of the cloth—not exactly the same, but very near it. Or if we put it on a yellow leaf it will turn yellow, or on a red one red. The chameleon does this to protect itself from being seen by anybody. But it never turns colour if it is oldish.

When the chameleon is angry the under side of its head gets a bright yellow colour, but it is quite harmless. Chameleons have very stiff skins, sometimes with black spots on them, but underneath they are much lighter. Chameleons change their skin about once a month, and the colour of the skin it puts off is white. Chameleons sometimes eat their skins when they are shedding them. While they are getting their new skins they keep quiet and sleep all day, but when they have got their new skins, which are a bright green, they are very lively.

The chameleon has a very short head and a very long tongue. Its tongue is very useful to the chameleon, for it uses it for catching flies, which are its favourite food. If it puts it out at a fly, the fly sticks to it, and it draws it in again—that is the end of the fly. It is very interesting to watch it catching flies; it sways from side to side very slowly.

Its eyes roll round in its head and it can see in whatever direction it

looks. They turn round, and it can look at something in front of it, and at the same time with the other eye it can look at something at its back.

The Kafirs hate chameleons and sometimes burn them. They are afraid of them, for they think they are spirits. They are superstitious and have a story of how a chameleon was sent to tell people that there was to be no death; then afterwards a lizard was sent to tell them there was going to be death. The chameleon lingered on the way eating fruit, but the lizard hurried on and got to the people first, and afterwards the chameleon got to the people, and they were so angry, it had been so slow that they would not hear what it had to say, but put snuff into its mouth and killed it, as the Kafirs do to this day.—III. Form, St. Anne's College.

Bird Life.

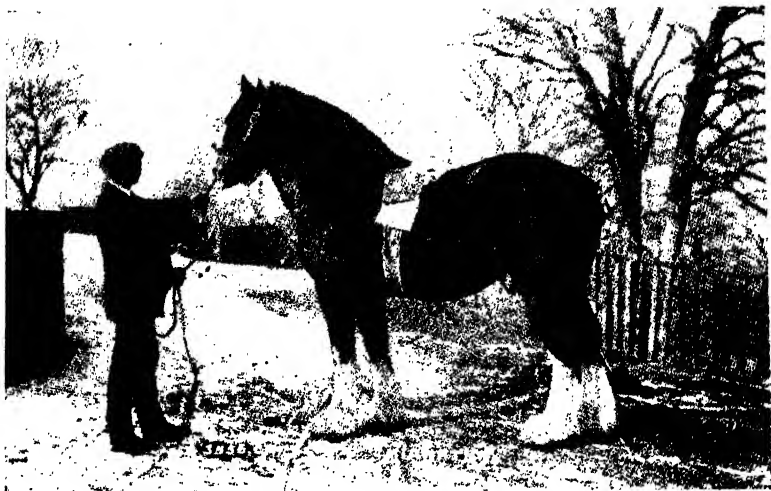
THE HONEY-GUIDE.

The Honey Guide (*Indicator indicator*) belongs to a small family of interesting birds, remarkable for their habit of guiding men and animals to the nests of the bees. It is widely spread all over the African Continent, but is nowhere common. It is a dark-brown bird about seven inches long, with a golden yellow patch on the shoulder. It is thoroughly parasitic in its habits, laying its eggs sometimes in the nest of the white-throated Swallow and sometimes in the nest of the Wood Hoopoe.

I WAS sceptical, at first regarding the good-will and ability of the honey-bird, and only credited it with the same instinct that a swallow reveals in accompanying a horseman on the veld and swooping up the grasshoppers disturbed by the horse. I imagined that the bird let *you* find the colony, but being such a skilled tactician, he conveyed the impression that *he* had found it. But many instances since then have distinctly proved the contrary, and convinced me that the bird will as often as not take the initiative. I can recall instances of it voluntarily appearing while we were resting and persist in chirping until one of us got up and followed it, with answering whistles and coaxing remarks. Reaching the immediate vicinity of the bees, its anxious and fussy notes would give place to soft and coaxing ones. It would then become silent, and remain so perched on a neighbouring tree, waiting its share of the spoil.

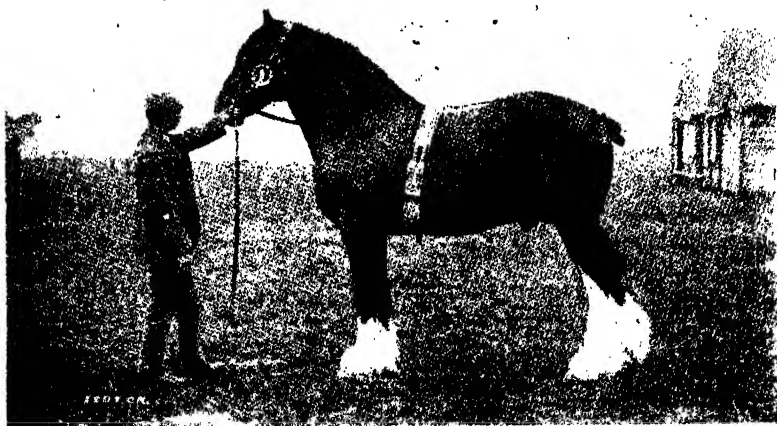
If not given a share the supposition is that it will "take you to a snake," "lead you into danger." I have heard of many instances in which people have been taken to dangerous animals and reptiles, but I think these encounters or traps are merely the incidents inseparable from veld or bush life, and that were not one's attention so occupied watching the bird and looking for bees, the danger would have been noticed before coming within harmful range and treated as an ordinary occurrence.

Some Native bee-hunters only leave it food on the last find, claiming



I.—THE CLYDESDALE.

Bred in the North of England and Scotland, the Clydesdale takes its name from the district in Scotland called the Clyde. It is admirably adapted for hill-side farm work ; is a fast walker, and combines power and activity in a high degree.



II.—THE SHIRE.

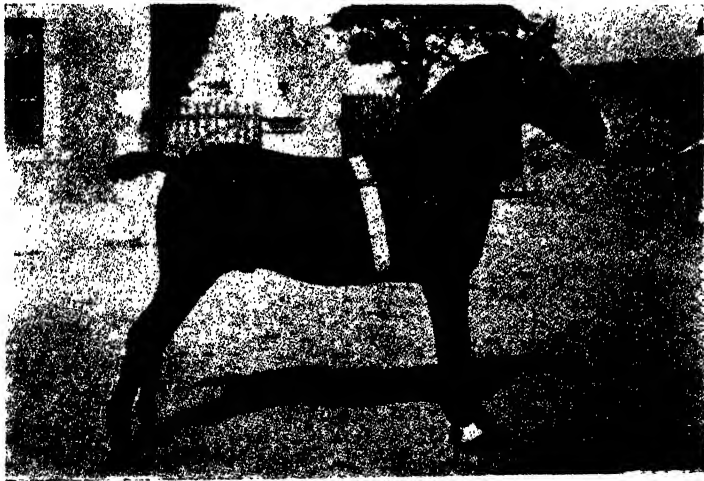
The old English Cart-Horse, now designated the "Shire," is the most powerful draught horse in the world, combining great weight and substance ; and is particularly suitable for brewers, contractors and railway work.

LEADING BREEDS OF HORSES—I.



III.—THE SUFFOLK.

A short-legged Cart-horse, bred in the East of England, and well-adapted for farm purposes and artillery work,



IV.—THE WELSH PONY

An extremely hardy and sound breed varying in height from 12 to 15 hands sure-footed, good pacers, and invaluable for harness purposes.

LEADING BREEDS OF HORSES II.

(To be concluded next month, and followed by "Leading Breeds of Cattle.")

that if allowed a share on the first find it will not look for more. I have known a man find five colonies in one day on those lines, but it is impossible to say if it was the same bird throughout.

The inter-dependence of hunter and bird is often carried to a fine point. It is not by any means rare to meet a Native wandering in an aimless manner over the veld, and blowing a reed whistle. He is calling any honey-bird that may be within hearing to his assistance.

It is a dull honey-bird that has not its little joke. At times it will entice one all over the veld, and when one is tired, hot, too thirsty to whistle back to it, and only just released oneself and parts of one's clothing from "Bamba Impala," otherwise "Bamba Mlungu," thorn, it will soar away with chuckling notes!

On starting an apiary a bee-keeper will often be shown his own bees. But when the bird realises that things do not fit in as they used to, it will perch in silence over a hive and look sagged and sad. One feels sorry for it and would like to ask it to dinner and explain the new order of things, if one could only talk birdy talk. Perhaps just as well—the bird might give his views on bee-keepers!

N. S. H.

Birds of Natal.

HAVE you seen the Starling flying, with the sunlight on his wings?
While thro' the trees his calling, in mournful cadence rings:
Have you watched the grey 'Nhlasis, like flying fishes fair?
Skimming o'er the waves of flowers, in the dewy morning air;
Or seen the dainty Hoepoe, with his proudly crested head?
Fly as lightly as a falling leaf, his chequer'd wings outspread:
He is indeed a kingly bird, and well may it be true—
"That he who takes a Hoepoe's life the cruel Fates pursue."
There's a Fuqwa oddly hopping, in his black and russet coat.
In the stilly summer moonlight, have you heard his fluty note?
As from a jug, soft gurgling, the waters slowly run,
So he sings of rain, forgotten 'neath the drought-compelling sun.
Then you know the cruel Johnnie, and you've heard his harsh "Beware!"
As he warns the whole bird garden of the coming danger scare:
In the bright and joyous morning, have you heard the Orioles call?
It's the sweetest, brightest music, and the clearest of them all:
Have you heard the Twiddies twitter, 'mid the louquat's yellow fruit
Or the silly Toppies laughing in the fig-tree by the spruit?
High in the swaying gum trees, the doves are cooing sweet;

A Hawk above is hovering; a swallow passes, fleet.
 Then there's the small bright Parrot, his coat is very gay;
 And the Tick-bird, that so oddly upon the oxen clings;
 And the Toucan, with his red beak, and the Tcgwan, quaint and grey;
 And the Hlog-a-Hlog, shrill screaming, his hanging nest he swings.
 The long-tailed Sakabula is flopping o'er the marsh;
 And from the krautz above him sounds the Gwababa's croaking, harsh.
 "NGAGA."

The Maritzburg Flower Show.

A FRIEND at court invited the Nature-study students to the flower show, and we all went from the Senior Infants to the "sweet Girl Graduates." For many children it was their first flower show, and eyes and mouths were open wide. The whole as a sea of blossom, a blaze of colour—a feast of beauty, never to be forgotten.

In the corridor there were vegetables fit for a Lord Mayor's dinner and strawberries that made one's mouth water and were voted by the Merchiston boys the finest thing on the Show.

Notes and Notions.

"The world is so full of a number of things"

THE yellow orchid is *Eulophia*, very near if not identical with *E. lauriflora*, but until the part of the *Flora Capensis* containing the Order is published, many plants of this order can not be named specifically.

The beautiful tree near the Shepstone monument in the Town Gardens, Maritzburg, is the Australian chestnut (*Castanospermum Australe*), a very handsome tree with bright red flowers.

The best tree for playground shade is the Natal Mahogany (*Trichilia emetica*)—Native name, *Umkuhlu*. The finest specimen is in the Mitchell Park, Durban. Three children can scarcely touch fingers round its stem!

The shrub you mention in the school grounds is the pomegranate. See Ruskin's "Proserpina" (p. 114): "I wish you also to remember," he says, "the cause of Proserpine's eternal captivity—her having tasted a pomegranate seed—the pomengranate being in Greek mythology what the apple is in the Mosaic legend. . . The pomegranate remains more distinctly a Jewish and Christian type, from its use in the border of Aaron's robe, down to the fruit in the hand of Angelico's and Botticelli's Infant Christs."

Notes from our Juniors.

A GOOD WORD FOR JOHNNIE.—Two Dronka shrikes, or bully-birds as the boys call them, have been very destructive to my bees this spring. Every morning they have breakfasted in front of my hives and been very displeased when I objected. At last a Johnnie Hangman arrived on the scene. Now he sits on the hive, and if either of them dare to approach he chases them off most vigorously.—W. J. F., Maritzburg.

[Are you sure that Johnnie is above eating bees?—ED.]

One day at school we found a nest. It was a twiddy's. One of the little birds was hanging between the nest and the branch. Brown climbed up, but he could not reach it, so he shook the branch and it fell down and one of the boys caught it in his hat. We were all standing round to catch it. Then they tried to put it back, but none could get it in again. All the time the mother was overheard chirping and chirping. At last Tallor put it in again, and as soon as it was in the mother came back.—PAT RITCHIE, Berea Academy.

** * Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.o. Editor, "Natal Agricultural Journal," Maritzburg.*

SHEEP NOTES.

Look after the teeth of the sheep, those with poor teeth can hardly be kept thrifty.

There is no class of stock that can be more readily improved by a careful selection and mating than sheep.

Keeping sheep overfat at any time is injurious, and should always be avoided, and especially the breeding animals.

If the ewes are kept too fat before lambing, they will secrete too much milk, and this may cause a caked bag.

Lambs will gain faster from the feed than the older sheep, showing that with sheep, as with other animals, the most rapid gains are made when they are young.

A sound fleece and healthy fleece go together.

If you want good-sized sheep, they must grow rapidly while young.

The breed of sheep for mutton is one that gives early maturity.

A sheep is rarely valuable enough to keep after it is six years old. Fatten and sell it.

Meteorological Returns.

Meteorological Observations taken at the Govt. Stations for the Month of Sept., 1910

STATIONS	TEMPERATURE (Fahr. Deg.)				RAINFALL (In Inches)					
	Mean for Month		Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day.		Total for Year from July 1, 1910	Total for Same period from July 1, 1909
	Maximum	Minimum					Fall	Day		
Observatory ..	72.6	57.8	87	43	3.84	9	1.56	9th	1.58	8.13
Stanger ..	—	—	—	—	2.51	6	1.03	12th	2.05	8.57
Verulam ..	78.1	54.5	102	43	3.12	12	.93	9th	4.29	7.93
Umbogintwini ..	74.0	56.0	84	41	4.02	17	.98	18th	6.53	9.18
Winkie Spruit ..	72.7	55.5	91	48	4.14	13	.95	29th	5.42	8.77
Port Shepstone ..	73.1	55.0	95	45	3.54	12	1.55	15th	6.21	7.11
Imbizana ..	74.5	55.1	92	44	2.86	10	1.21	17th	4.49	8.76
Mid-Illovo ..	69.9	52.3	101	42	3.75	15	1.4	9th	5.14	7.55
Bulwer ..	65.7	43.1	89	23	2.75	15	1.12	8th	3.65	15.9
Richmond ..	70.8	48.4	94	36	3.41	12	.77	9th	6.79	6.94
Krantzkloof ..	71.5	55.9	91	45	3.81	13	.92	10th	5.19	7.55
P.M.B. N.G. Asylum ..	73.5	48.5	99	36	2.91	12	1.55	9th	4.51	5.46
Howick ..	72.6	47.2	93	35	3.11	11	1.53	9th	4.71	4.61
New Hanover ..	73.7	51.0	93	37	2.91	14	1.95	9th	4.32	5.62
Krantzkop ..	74.3	51.9	92	46	3.6	10	1.93	9th	3.55	1.16
Greytown ..	73.0	46.5	94	35	3.19	12	1.59	9th	1.99	4.77
Lidgerton ..	73.5	53.0	93	27	3.33	9	1.51	1st	5.14	1.59
Nottingham Road ..	69.5	34.6	91	23	2.93	8	1.11	9th	1.52	1.75
Estcourt ..	74.3	45.5	95	31	1.66	4	1.98	10th	1.96	2.24
Weenen ..	81.5	41.6	103	32	1.44	8	1.54	9th	1.54	2.59
Ladysmith ..	78.9	49.0	101	31	1.13	8	1.31	9th	1.41	5.15
Nqutu ..	81.2	47.7	92	42	2.37	5	1.81	9th	—	—
Dundee ..	76.0	47.4	91	31	1.97	6	1.60	9th	1.97	1.19
Newcastle ..	82.2	34.0	93	18	1.12	4	1.12	19th	1.12	5.85
Charlestown ..	71.9	41.7	81	24	2.09	5	1.81	16th	2.09	1.12
Vryheid ..	73.7	49.5	95	42	2.79	9	2.31	19th	2.79	3.75
Paulpietersburg ..	82.3	46.9	95	43	2.65	9	2.24	9th	2.13	—
Ngomi Forest ..	67.3	17.1	89	37	1.13	19	2.06	17th	8.10	8.21
Umbombo ..	73.5	51.6	85	46	3.14	9	1.60	10th	1.44	1.67
Nongoma ..	71.9	49.2	91	41	2.5	9	1.29	16th	2.91	6.2
Hlabisa ..	74.1	53.1	91	45	1.77	8	1.53	14th	5.27	6.71
Mahlabatini ..	79.5	42.8	95	32	2.49	7	1.61	9th	3.63	4.18
Empangeni ..	77.8	50.0	100	41	3.48	9	.95	9th	5.63	11.22
Mtunzini ..	84.1	52.0	97	15	6.45	9	2.59	6th	11.84	19.98
Point ..	—	—	—	—	5.49	14	1.33	12th	7.55	5.14
Ixopo ..	—	—	—	—	3.21	10	1.13	17th	4.14	5.77

Meteorological Observations taken at Private Stations for the Month of Sept., 1910.

STATIONS	TEMPERATURE (In Fahr. Degs.)		RAINFALL (In Inches)					
	Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day.		Total for Year from July 1, 1910	Total for Same period from July 1, 1909
					Fall	Day		
Maritzburg, Botanical Gardens ..	95	31	2.60	11	1.25	9th	4.53	5.10
Ottawa ..	—	—	37.8	12	.91	13th	5.09	7.94
Mount Edgecombe ..	—	—	8.53	13	.91	10th	4.81	—
Cornubia ..	—	—	4.10	—	—	—	5.09	—
Milkwood Kraal ..	—	—	3.04	—	—	—	3.71	—
Blackburn ..	—	—	3.19	—	—	—	4.69	—
Saccharine ..	—	—	3.17	—	—	—	1.43	—
Umtinto, Beneva ..	—	—	3.71	11	.52	8th	5.52	7.29
Riet Vlei ..	85	51	1.95	3	1.59	9th	2.44	2.55
Cedara - Hill Station ..	97	31	2.77	12	1.25	13th	4.33	1.45
Cedara - Vlei Station ..	91	29	3.11	14	1.52	13th	4.03	5.15
Winkel Spruit ..	91	43	4.14	13	.95	23th	5.32	8.77
Weenen ..	94	31	1.45	2	1.31	9th	1.33	2.75
Giant's Castle ..	69.1	42.7	2.01	4	1.42	9th	2.74	3.65
Umlangeni ..	—	—	3.22	11	1.06	17th	4.32	7.69

Coal and Labour Return.

Return of Coal Raised and Labour Employed at the Natal Collieries for the month of September, 1910:—

COLLIERY	Average Labour Employed					Output Tons Cwt.
	Productive Work			Un-productive Work	Total	
	Above Ground	Below Ground	Total			
Natal Navigation ..	369	719	1,088	—	1,088	28,200 19
Durban Navigation ..	218	751	969	13	1,012	22,516 —
Elandslaagte ..	317	777	1,094	29	1,123	21,919 —
Glencoe (Natal) ..	188	668	756	42	798	18,089 1
St. George's ..	254	502	756	10	766	17,295 —
Natal Cambrian ..	178	482	660	35	695	14,058 3
South African ..	178	416	594	20	614	11,511 4
Dunder ..	244	438	682	—	682	11,000 7
Hlobane ..	142	313	455	42	527	10,433 10
Burnside ..	209	288	507	105	612	8,856 15
Hatting Spruit ..	106	329	435	4	439	8,794 3
Newcastle ..	74	307	381	10	391	6,502 12
Ramsay ..	85	180	265	6	271	6,064 2
Natal Steam ..	80	212	292	—	292	5,546 8
Talana ..	89	135	224	—	224	4,201 10
Ballengeich ..	76	93	168	15	183	2,364 3
West Lennoxton ..	52	76	128	—	128	1,054 16
Utrecht ..	13	26	39	212	281	1,089 15
Dewar's Anthracite ..	15	14	29	11	40	250 —
Vanbank ..	4	8	12	10	22	13 —
Makates Kop ..	3	—	5	—	5	9 —
Totals ..	2,936	6,663	9,599	94	10,103	199,379 8
Corresponding Month, '09 ..	2,567	5,392	7,959	464	8,423	154,736 14

	Productive Work			Un-productive Work	Total. Aug., 1910	Total. Aug., 1909
	Above Ground	Below Ground	Total			
Europeans ..	235	209	444	63	507	428
Natives ..	1,051	4,319	5,370	427	5,797	4,464
Indians ..	1,650	2,135	3,785	104	3,339	3,531

* Cost charged to Capital Account.

† Includes August return.

CHAS. J. GRAY,

Mines Department, Pietermaritzburg,
7th October, 1910.

Commissioner of Mines.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal Bunkered and Exported from the Port of Durban for the month of September, 1910:—

					Tons. Cwt.
Bunker Coal ..	..	..	..	..	113,260 15
Coal Exported ..	..	..	..	..	18,555 9
Total ..	..	..	..	..	132,816 4

Customs House, Port Natal.
30th September, 1910.A. D. C. AGNEW,
for Collector of Customs, Natal.

Return of Farms at Present under Licence for Lunglockness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Crow	Ladysmith	Scab	Natives	Rooiboom
		"	"	Rooipoort
		"	H. Nicholson	Ne' herton
		"	Natives	D.iefontein
		"	"	Elandslaagte
		"	B. J. Neina'er	Tylden
		"	D. A. Henry	Envogel Vlei
A. P. Crow and Murdoch	Ladysmith	"	P. Grant	Town Land
		"	H. W. Nel	Livest. Home
		"	H. Fritchley	Avonford
		"	Natives	Davel's Hook
		"	"	Fouries Kraal
		"	"	Mattwami' Kop
		"	"	Gevonden
		"	W. M. J. Buys	Ruit Kril
		"	T. Allison	Jacob's Ladder
		"	N. Meyer	Klipport
		"	C. Cove'ary	Eruapton
		"	G. I. Perry	Glaston Bag
A. B. Koz	Portion of Estcourt	"	J. Bruscott	Elands Spruit
		"	C. Hatting	Doornkop
		"	G. Spearman	Woodlands
		"	P. van der Merwe	Vaalbank
		"	W. Pretorius	Mount Alice
A. C. Williams	Utrecht	"	Natives	uma
		"	"	Sparkispruit
		"	"	Goedehoop
		"	O. J. Meyer	Spitzkop
		"	D. M. M. Pfaff	Wetterseden
		"	Natives	Gumtree Grove
		"	"	"
		"	"	Goede Hoop
L. T. Trenor	Alfred	Lunglockness	J. T. Clothier	Whitcliff
		"	R. Fynn	Hagbende
		"	Natives	Location No. 2
		Scab	"	" No. 6
		"	"	Mc. Hells
R. Wingfield Stratford and Havemann	Newcastle	"	Natives	Location No. 2
		"	W. Osborn	Roo point
		"	G. M. rith	Kon ngsberg
		"	Unknown	Nr mandien Pound
		"	C. G. H. Laas	Redcliffe
		"	Natives	No mandien
		"	H. J. Hearn	Blackmore
		"	J. V. Wade	Macclesfield
		"	D. N. van Rooyen	Les Kop
		"	Natives	Jubilee
		"	E. Saunders	Horse hoe
		"	O. Plutz	Gu derland
		"	R. S. Miller	Colagh
		"	A. Tourle	Majuba North
		"	A. Vanderplank	Eaglescliff
		"	F. Meyer	Shepherd's Bush
		"	A. J. van Wyk	Genton
		"	M. Collyer	Tatham's Camp
		"	A. M. van Niekerk	spitzkop No. 5
		"	J. A. C. Morris	Kern
		"	M. C. Adendorff	Kendal
		"	C. J. de Villiers	Waterford
		"	F. Meyer	Lo Kop
		"	C. Jackson	Garden Villa
		"	B. J. Whiggs	Leicester
		"	F. J. Osthuyzen	River Bank
		"	A. M. Cronje	Vlitslaagte
		"	Dr. A. J. Abraham	Nutts
		"	H. J. & W. Yutaman	Fountain Dale
		"	A. J. Uys	Klaaubosch
		"	"	O e Tree
		"	"	Fountain Dale

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
G. Daniell	Vryheid	Scab	Natives	Trad
			D. Swart	Aloebom
			W. Landman	richoek
			Natives	Touls
			E. Symons	Barbeestlaai
			Natives	Berlin
			C. van Rooyen	Noitgeven
			Native	"
			J. H. Guter	"
			Nel Bros.	Velgenog
			Natives	Dabebrecht
			J. R. d. ord	"
			L. Kanya	Welgeger
			Natives	"
			D. De Bruin	R. oepoort
			Natives	Me zefon ein
			J. H. Erland	Garing
			T. W. Dikes	Groot gewacht
			R. O. van Rooyen	Bakswol
			Native	Welgeger
J. R. Cooper	Nkundhla & Ngutu		H. Haing	Prosperit
			Beznin einhist	Nooitverwicht
			Native	Dabebrecht
			"	Overshot
			B. J. Human	Eenzame outu
			Natives	Teles Hill
			Petrus Mate	Itela Hill
			Natives	"
			"	Insuzi
			"	Sandwana
			"	Siyongo
			H. Fry	Empendile
			Natives	Nguni Town Lands
			"	Macelo
			"	lood River
E. Varty	Western Umvoti		"	Mkonjane
			"	Sela-shana
			"	Magabeni
			"	Nqutu Fort
R. Mayne	Eastern Umvoti & Krautkop		"	Sondwood
			"	Black River
			"	atshi
			"	Telesi Hill
A. H. Ball	Wenen		"	Nguni Town Lands
			"	Vermack's Kraal
			"	Craigleburn
			"	Thomview
E. J. Marshall	Dundee		F. R. Nel	Thomview
			C. A. Chirlewood	"
			J. P. S. van Rooyen	"
			"	"
J. F. van Rensburg	Ngotshe		Natives	Rizina
			"	Ematimotolo
			"	Veltevredin
			"	Groenkop
			"	Uncegen
			P. P. van Rooyen	Doornkloof
			L. J. van Rooyen	Bellevue
			T. J. van Rooyen	"
J. F. van Rensburg	Ngotshe		Native	Zypherfontein
			W. W. Harding	Milietuin
			M. Lotter	Watefall
			P. H. van Rooyen	Buffalo Hoek
			A. Jansen	Sheepridge
			L. Biddenhorst	Klipfontein
			A. J. G. Meyer	Doenkop
			Native	Onthevend
J. F. van Rensburg	Ngotshe		"	Muy
			"	Dunvill
			"	Waterfall
			Unknown	Dundee Pound
			P. J. C. Liversage	Tweersmarque
			P. J. Swart	Rietfontein
			M. J. Herbs	Kipbig
			C. J. van Rooyen	Borveld
J. F. van Rensburg	Ngotshe		Natives	Rietfontein
			"	Klip Rivier
			"	Smiddeel
			"	"

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
E. W. Larkan ..	Umsinga ..	Scab	Native ..	Gordon M. moria
		"	" ..	Jobskop
K. Ripley ..	Emtonjweni ..	"	" ..	Vermaak's Kraal
		"	" ..	Kwamagwaza
C. E. Walker ..	Portion of Estcourt	"	Wm. McFie ..	Koninabe g
		"	" ..	Highlands
		"	" ..	Lowlands
		"	S. F. Boshoff ..	Nekerkfontein
		"	S. B. ...hatt ..	Stange's Hoek
		"	H. J. K. Miller ..	Beacon Hill
		"	S. C. Mura's ..	Molan Spruit
A. Hair ..	City and Uagerei ..	"	Native ..	Bishopstowe
		"	Govt. Bact. ..	Golf Links
		"	Natives ..	Zwartkop Location
J. Radford (acting)	Pan'pietersburg ..	"	H. Rohrs ..	A. ton
E. W. Bowles ..	Isopo ..	"	C. J. Webb ..	Rocky Glen
		"	W. Whitelaw ..	Glenmaize
		"	Natives ..	McKenzie
J. W. Stewart ..	Bergville ..	"	F. Zuckel ..	Leaseline
		"	Moeder & sons ..	Zuur Plaat
		"	R. D. Newton ..	Rondebult
E. J. B. Hosking ..	Richmond ..	"	A. Wright ..	Hamilton
H. van Rooyen ..	Kalsanango ..	"	Natives ..	Onvergenoge

Division of Agriculture Notices.**FEEs FOR AGRICULTURAL ANALYSIS.**

It is hereby notified that Farmers and others can secure analytical determinations from the Government Laboratory, Central Experimental Farm, Cedara, in accordance with the following scale of fees, which is subject to revision :—

MINERALS TESTED FOR PHOSPHATE :	Scale I.			Scale II.		
	£	s.	d.	£	s.	d.
Qualitative	0	7	6	0	5	0
Quantitative	0	10	6	0	7	6
Complete	1	1	0	0	15	0
FERTILISERS AND FEEDING STUFFS :						
Determination of 1 constituent	0	7	6	0	5	0
Determination of 2 or 3 constituents	0	15	0	0	10	0
Complete analysis	1	1	0	0	15	0
SOILS : Partial analysis of a soil in relation to its fertility						
Complete analysis of a soil	2	2	0	1	1	0
Complete analysis of a soil, with mechanical analysis	3	3	0	2	2	0
WATER : Irrigation and drainage						
VEGETABLE PRODUCE : Fodder, Ensilage, Grain, &c.	1	10	0	0	15	0
MILK, CREAM, BUTTER : Fat only	0	5	0	0	2	6
" " : Complete	0	15	0	0	7	6
WATTLE BARK AND TEA : Tannin	0	5	0	0	2	6
CATTLE DIPs : Qualitative analysis of 1 to 3 principle constituents						
Quantitative analysis of 1 to 3 principal constituents	1	1	0	0	10	6
INSECTICIDES :						
Qualitative analysis each constituent	0	5	0	0	2	6
Quantitative " " "	0	10	0	0	5	0

Scale No. 1 is applicable to samples handed in by merchants and Dealers, and where trade interests are involved.

Scale No. 2 is applicable to samples forwarded by *bona fide* Farmers and Gardeners.

All fees are payable in advance.

Samples will be accepted at the discretion of the Director, and must be properly selected and labelled.

The Department reserves the right to publish the results of any analysis performed by it; and, where such is deemed of sufficient public interest, it will remain at the discretion of the Director to remit any charges hereunder.

All samples must be addressed to the Chemist, Central Experimental Farm, Cedara.

TREES FOR SALE.

To encourage tree-planting, transplants and seeds of forest trees are supplied by Government, so far as in stock, at the undermentioned rates, exclusive of carriage, from the Government Nursery, Central Experimental Farm, Cedara.

Transplants of Eucalyptus, Pines, Acacias, Casaurinas, Cupressus, etc., about 25 trees in each tin, at 8s. 4d. per 100 trees. Trees in separate tins at 1s. each.

Transplants of scarce kinds, larger trees, or surplus stock, when available, will be charged at special rates, which will be furnished on application.

Tree seeds, in variety, at 6d. per packet. Price per pound, which fluctuates, will be furnished on application.

Package and postage of seed, when required, charged 1s. per lb. extra.

Orders cannot be accepted for a smaller number than 100 trees.

PURCHASE OF TREE SEEDS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haird Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible:—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.
 Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.
 Fruit.—Orchardist, Cedara.
 Accounting Business.—Accounting Clerk, Cedara.
 Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.
 Apiculture.—Apiarist, Cedara.

E. R. SAWER,
 Director, Division Agriculture, Cedara.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

Charges in respect of Cattle and the Meat of Cattle.	Calves up to one year old.	Cattle over one year old.	
		Rate per single head.	After reaching 100 head in month.
<i>Abattoir.</i>	s. d.	s. d.	s. d.
1. Receiving, per head... ..	0 3	0 6	0 3
2. Killing and Dressing, per head	2 0	3 6	2 9
3. Disinfectants	0 1	0 1	0 1
4. Cleaning Tripes, each	0 6	0 6	0 6
5. „ Sets Feet, per set	0 6	0 6	0 6
6. „ Calves' Heads, each	0 9	—	—
<i>Bagging Charge</i>			
1. Per Body of Beef	1 3	2 6	1 9
2. Bagging Labour, per body	0 3	0 6	0 3
Hessian, 3d. per yard.			
<i>Special Storage Rates for Chilling up to 72 hours.</i>			
1. Chilling Beef, per body	1 3	2 9	1 9
2. Chilling Offal, per set	0 6	1 0	0 6

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.
 Department of Agriculture, Maritzburg, 21st December, 1908.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1905).

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement after 25th April next. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 131.—Age 20. Was a student at College of Agriculture, Cape Colony, where he gained a diploma. Has also won prizes for butter making at the Rosebank and Port Elizabeth Shows. Has been in the services of the Orangia Creamery Co., Bethlehem, which he left on account of conditions of employment not being suitable to his requirements.

No. 132.—Age 37. Has had nine years experience as Assistant and Manager on Tea Estate in Assam, and has a thorough practical knowledge of tea making in all its Departments. Would like to obtain an appointment in a Tea Garden in Natal. Has a knowledge of several Indian languages.

No. 133.—Desires appointment as Farm Manager. Has had a thorough knowledge of growing and packing fruit, also lucerne growing and hay making. Has also had experience in Ostrich and Stock farming.

No. 134.—Age 37. Wishes to obtain experience on an Ostrich farm for a year. Would be willing to invest £700 at the end of the term of probation, and on the expiry of a year's partnership would be willing to increase that sum to £1,000.

No. 135.—Age 35. Has a knowledge of poultry and bee-keeping. Total abstainer. Non-smoker. Good references. Is anxious to get on to a farm.

No. 136.—Wishes to secure employment on an Ostrich farm. Very good references.

No. 137.—Understands carpentry and wagon making. Is anxious to secure a position on a farm.

No. 139.—Age 25. Seven years' experience in mixed farming in Springfield District.

No. 140.—Age 25. Colonial born. Has had 3 years experience on farm. Two years in the Mooi River Division, and one year Dairy Farming in the Transvaal. Good references; speaks Zulu.

No. 141.—A married man seeks employment on a farm, has had much experience with stock. Understands Native language.

No. 142.—Age 36. Tea Planter, twenty years experience, India, Ceylon and Natal. First class references and gold medalist. Expert knowledge of Tea factory engineering, planting, and manufacture—New openings a speciality. Fluent Indian linguist, and capable business man. Wishes to take over complete charge of large Tea concern. Liberal salary expected, and first class work guaranteed. Correspondence invited from Companies or Capitalists.

No. 144.—Desires employment on a farm in any capacity. Is the son of a farmer in Wiltshire, and has been in S. A. since 1900. Has had some experience on farms in this country.

No. 145.—An experienced Natal farmer finds it necessary to leave his farm on account of the near approach of East Coast Fever, and would be glad of a position as manager on an estate or to work one on shares. Has a good knowledge of general agriculture, and of all kinds of live stock, which he was accustomed to handle on Australian Stations.

No. 146.—An experienced stock and agricultural farmer desires position on a farm. Has had 25 years experience of mixed farming. Speaks and writes Dutch and English. Also speaks Zulu, and is accustomed to handling of coolies. Good references.

No. 147.—Desires to obtain a situation as manager or under manager on a farm. Has had a great deal of experience with all kind of farming, stock, mixed, and coast. For the last ten years has been manager of a farm on the Coast, and prior to that he was engaged in farming in the Dundee and Harrismith districts respectively, when he took many prizes for stock on various Agricultural Shows. He has had much experience with machinery also and understands building. Offers first-class references. Can speak, read and write Dutch and can speak Kaffir. Is accustomed to managing Coolies.

No. 148.—Has a fairly good practical knowledge of farming in Ireland, and desires to obtain a situation on a farm in this Country.

149.—Understands farming and is a good Zulu linguist. Desires situation on a farm more especially as manager. Holds a certificate for book-keeping.

No. 150.—Age 21, desires to obtain a situation on a farm. Can fence, plough, is handy with carpenter's or engineer's tools, understands the Cream Separator, has had some experience in hay making, knows how to manage a gang of natives and can speak the Zulu language. States he is not afraid of hard work, and is strong and healthy; is an abstainer and does not smoke. Will work 6 months at a nominal salary with board and lodging free.

No. 151.—Is anxious to obtain a situation on a farm; has not had any experience in farming. Can speak Kafir and understands bookkeeping. Is not afraid of work.

No. 152.—Is anxious to obtain a position on a farm. Has not had any experience in farming. Is a carpenter by trade. Is not afraid to work.

EMPLOYMENT FOR GIRLS.

The Minister of Agriculture has received a letter from the Chairman of the Transvaal Land Settlement Board, stating that he has been asked by several correspondents in England if there are any openings in South Africa, such as in creameries, for girls trained at Bromsgrove Colonial College and other such training centres in England. We should be glad to hear from any institutions or farmers in Natal who may be in a position to offer situations to girls who have been trained at such Colleges, when we shall be pleased to place them in communication with the Chairman of the Transvaal Land Settlement Board.

Farm Apprentices' Bureau.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- No. 3. Age 24. Colonial born Has a knowledge of bookkeeping.
- „ 15. Age 19. Is desirous of learning farming.
- „ 25. Age 23. Bricklayer by trade. Is anxious to get on a farm.
- „ 27. Age 19. Has had one year's experience on a farm in the Cape Colony.
- „ 53. Age 17. Has had 18 months' experience of farming in Zululand. Speaks Zulu. Understands cattle and horses.
- „ 56. Age 20. Strong, tall and healthy, good rider, fond of stock, and has had some years experience of general farming. Small salary required with board and lodging.
- „ 57. Has had two years experience on a farm. Speaks Zulu and has a slight knowledge of Dutch. Is anxious to get on to a farm.

PREMIUM OFFERED.

We have received an application from London in which an applicant expresses his desire to learn farming in Natal, for which he is willing to pay a premium to a first-class farmer who may be willing to take him on to his farm. He has had some training at an Agriculture College in England. We shall be glad to hear from any Natal farmers who may be willing to enter into an agreement with our correspondent for this purpose.



SCHOOL GARDENS IN MARITZBURG.

Merchiston Preparatory School, at 8.30 a.m.

The Natal Agricultural Journal

Our Agricultural Unions.

"Our constitution wisely limits us to agriculture, and prohibits politics, but I am well within the bounds in saying that this Conference has the greatest confidence in the present Government fostering in the widest manner possible the true interests of agriculture without reference to State or section."

THUS spoke the President of the South African Agricultural Union—Mr. E. W. Evans—in his address to the delegates assembled on the occasion of their Annual Conference last month in Capetown. We have extracted this sentence because to our mind it gives voice not only to the feeling which existed in the minds of the delegates, but also to the confidence felt in the Government, so far as agricultural interests are concerned, by farmers in practically all sections of the country; and more than that, it symbolised, as it were, or perhaps we should say it was a premonition of the broad and sympathetic manner in which the delegates discussed each other's motions, no matter what part of the country they hailed from, and the general spirit of fair-play—even of brotherhood—which characterised the discussions right through. We have attended other Conferences of the Inter-Colonial Agricultural Union, and we have always been gratified to see the friendly spirit in which delegates from sections as far apart as the Western Province and Natal, Rhodesia and the Eastern Province, have met and discussed the various resolutions which have come before them; but at this last Conference, in Capetown, the first one under Union, the spirit of brotherhood was even more evident, and this was, in fact, the feature of the proceedings which struck us most strongly of all: There were, of course, occasions—though only one or two—when there seemed to be a tendency to forget inter-Provincial courtesies (as when the inevitable question of border restrictions on fruit and produce was dragged in) but matters were very soon smoothed over and the spirit of friendliness prevailed once more. Throughout the discussions there was a feeling of "Union" in the air;

the delegates had met as brother farmers of one great country, and the realisation of this was evident all through; in fact, the proceedings had more the feeling of our own Natal Agricultural Union Conferences.

The importance of these Conferences can hardly be overestimated. In the past the Inter-Colonial Agricultural Union has done a great deal of good work, and has, we feel sure, been of assistance to the various Colonial Governments by bringing before them the desires and opinions of the farmers of South Africa, but up till last year their work was necessarily hampered by having to deal with five separate Governments that might possibly, on some questions, have as many different points of view. Now, however, two Governments only have to be dealt with, and one of these represents the bulk of South Africa. This brings the Agricultural Union more than ever into the position of an Advisory Bureau, and, as such, not only will its decisions necessarily receive closer attention at the hands of the authorities and naturally result in more effective action than in the days when four separate Governments ruled the southern portion of the sub-continent, but they will also undoubtedly prove of greater value to the Government itself. A sympathetic Government, such as we have, naturally likes to have the opinions of a representative body of farmers, and the South African Agricultural Union will enjoy more than ever the distinction of being the connecting link between the farmers and the Government. For, consider the manner in which the Union is constituted. Scattered all over South Africa we have a large number of farmers' associations of various kinds, and every farmer who desires to make his voice heard, who wishes to become a factor in the agricultural progress of the country, has but to join one of these local associations, attend its meetings and take active interest in its work. All these Associations may become affiliated—and most of them are—to the Provincial Agricultural Union, and then they have the right to nominate a certain number of delegates to attend the Annual Conferences of the Provincial Unions, there to bring forward resolutions which the local associations wish to have discussed and passed for forwarding to Government. These resolutions, passed by the Provincial Agricultural Unions, have in the past been submitted to the Colonial Governments, and we take it that in future they will be sent to the Provincial Governments. Each of these Provincial Unions has the right to nominate delegates to attend the Annual Conferences of the South African Agricultural Union—which is nothing more than an affiliation of the Provincial Unions—and to bring forward any matters which may be considered worthy of discussion. In this way, every individual farmer in the country may make his influence felt in the degree in which he interests himself in the doings of his own local association. Evidently then, the Pro-

vincial and South African Agricultural Unions are representative bodies whose deliberations are of very great importance and whose decisions must be of great value to the Government as embodying the opinions and desires of the great body of farmers. To the delegates themselves all this is nothing new, but the present is a timely opportunity for emphasising the value of these gatherings, for the benefit of those farmers who do not belong to any association and of those who, though members of their local associations, take little or no interest in the work of these bodies—and of these, we are afraid, there are far too many, in other parts of South Africa as well as in Natal.

In this issue we publish a full report of the proceedings of the Cape-town Conference at the beginning of last month, of which we recommend careful perusal as it contains many points of interest and reflects the work of the Union. We regret we are unable to print the whole of the report in this issue, from considerations of space, and as we think that to condense it more than we have already done would detract from its value, we are obliged to hold over the second portion of it until next month. This report should be carefully studied, especially by those of our readers who in the past have been sceptical as to the value of the work done by their district associations.

Farming Progress in Natal.

SINCE we last went to press the last of the Statistical Year-Books prepared under the old Colonial Government has made its appearance. The figures which it contains refer, in the case of the section dealing with agriculture and live stock, to the year 1908-9. The value of statistics is always better brought out when comparisons are offered, and in the year-book before us we find an interesting comparative statement for the years 1904-5 and 1908-9, which throws some light upon the progress or otherwise which farming has made since the 1904 census was taken. We find, for instance, that the total area of land under cultivation in Natal when the last returns were taken was 993,639 acres, whilst in 1904-5 the area that was being cropped was 915,869 acres. Of the present area approximately half a million acres are being cultivated by Natives, as compared with 479,582 in 1904-5; Indians are responsible for 12,000 acres, an increase of less than two thousand acres over the area for 1904-5, the balance of 451,638 acres being cultivated by Europeans (the European acreage in 1904-5 was 395,918).

Turning to the chief production of these acreages, we find that the production of mealies on European farms has increased since 1904-5 by approximately 100,000 muids, the production for 1908-9 having been 797,820 muids (our forecast, it will be remembered, was 800,000). The Natives produced approximately the same quantity of mealies as the European farmers: the production by Indians in 1909 amounted to 100,000 muids. The total production of mealies for that year, it is of interest to note, was 1,697,820, as compared with 1,558,324 muids in 1904-5. There has been a fine increase in production of lucerne, which has jumped from 517 tons in 1904-5 to 4,120 tons in 1908-9. Pumpkins, too, show a good increase—from 6,830 to 19,708 tons. The increase in regard to beans has also been fair—4,638 muids in 1904-5 to 6,534 muids in 1908-9. The production of wattle bark has been nearly doubled; in 1904-5 the production was 13,620 tons, and in 1908-9, 24,207 tons. In 1904-5, 29,796 short tons of sugar were produced; in 1908-9 the production was 86,790 short tons. Molasses, of course, show an increase as well—from 2,823,630 lbs. to 5,205,563 lbs. The production of tea has increased from 1,633,178 lbs. to 1,773,203 lbs. These are the principal increases so far as crop production is concerned.

The figures relating to cattle are, of course, of especial interest. The total number—in possession of Europeans, Natives, and Indians—on the 31st August, 1909, was 502,212, as compared with 666,903 in 1904. Details of these are as follows:—Owned by Europeans: 1904, 317,692; 1909, 210,412. Owned by Natives: 1904, 343,159; 1909, 280,000. Owned by Indians: 1904, 6,052; 1909, 2,880. In the figures relating to live stock the greatest increase noticeable is in regard to sheep. In 1904 the total number of sheep in Natal was 668,378; in 1909, the number had increased to 1,068,996. Of this latter number the European farmers possessed 916,996. Mules have increased from 4,450 to 10,032; donkeys, from 2,448 to 10,330. Horses show a slight decrease. There is a slight increase in the number of pigs, and the number of these animals in Natal last year was 77,238. Poultry, we regret to notice, have decreased from 1,233,319 to 1,087,767; and also, strange to say, the number of ostriches last year was less than in 1904—803, as compared with 1,523.

These are the principal features of the comparative statements which appear in the 1909 Year-Book, and considerations of space preclude any more detailed examination of the figures which the Year-Book contains. We may at a later date find an opportunity to go into the figures more minutely.



A Happy Christmas and a Prosperous New Year to all our readers!

Forced Moulting of Hens.

The belief is more or less prevalent among poultry-keepers that, if hens are forced to shed their feathers early in the season by partial starvation, a larger number of eggs will be produced during the winter than if the hens are allowed to moult naturally. Some who have tried to "force the moult" favour the practice; others condemn it. According to a late number of *Experiment Station Work*, one of the organs of the United States Office of Experiment Stations, this point has been tested at various of the United States Experiment Stations. At the Pennsylvania Station two pens of White Leghorns were used for the purpose, and the conclusion drawn from the results of the experiment is that "forced moulting seems at first to depress then increase slightly egg production, but the net results at the end of three months were against forced moulting." An extensive experiment has been made at the Cornell Station, also, with the following results.

As compared with the fed flocks the starved hens moulted slightly earlier and more uniformly; were in somewhat better condition at the end of the moult; moulted (average) in slightly less time; gained less above first weight during moult; gained slightly more in weight during the year; resumed production somewhat more quickly after moult; laid a few more eggs during winter; were materially retarded in egg production; produced less eggs after the moult was completed; produced eggs at a greater cost per dozen; consumed slightly less food during the year; had slightly less mortality; showed slightly more broodiness; and paid a much smaller profit. The general conclusions were that with the methods employed with White Leghorn fowls, one, two, or three years old, it does not pay to "force a moult" by starvation method, and that apparently it is good policy to encourage hens by good care and

feeding, to lay during late summer and autumn, rather than to resort to unusual means to stop laying in order to induce an early moult with the hope of increasing productiveness during early winter, a season which is naturally unfavourable to egg production. "In short, it appears wise when hens want to lay to let them lay."

Pineapple Experiments.

The Florida Agricultural Experiment Station recently undertook an experiment with a view to finding out whether the quality of pineapples is affected by the kind and quality of the fertiliser used. It is known, is affected by the kind or quality of the fertiliser used. It is known, fertilisers, and it, therefore, seemed desirable to ascertain, by analysis, if the same is true in regard to pineapples. The work was really a continuation of previous investigations in connection with pineapple culture in which an attempt was made to ascertain the effects of different fertilisers upon the quantity of fruit. In those investigations, it may be remarked, it was shown that, with an increase of fertilisers up to a certain point, there was a decided increase in the number of larger-sized pineapples, though the total number of fruits was not materially increased; and also that certain fertilisers assuredly have a deleterious effect upon the pineapple plant and lessen the quantity of fruit produced. The Station has now published the results of its experiments in connection with the influence of fertilisers upon the quality of fruit (Bulletin No. 101), and we give below a summary of these results, as they are likely to prove of some interest to those of our readers who are engaged in pineapple-growing.

The eating quality of pineapples, as far as this depends on the amount of sugar and acid in the juice, does not appear to be affected by the kind of fertiliser used; the shipping quality may be. Increasing the fertiliser slightly increases the sugar content and very slightly decreases the acid. The larger fruits contain a greater percentage of sugar than the small ones, and a slightly smaller percentage of acid. The ratio of reducing sugars to sucrose is greater in the large fruits than in the small ones. The percentage of nitrogen in the fruit does not appear to increase with an increase of fertiliser. From the analyses reported the following averages have been made up. The weight of the fruit was, in all cases, reckoned without the crown:—Weight of one fruit, 966.2 grams; edible portion, 61 per cent. of fruit; available juice, 92.84 per cent. of edible portion; total solids in whole fruit, 15.18 per cent. of fruit; nitrogen, 0.064 per cent. of edible portion; acids calculated as citric, 0.98 per cent. of juice; reducing sugars, 2.60 per cent. of juice; sucrose, 9.47 of juice; total sugars, 12.07 per cent. of juice.

Forgan's Stone-gathering Machine.

In our October issue, it will be remembered, we published an inquiry which we had received asking for further particulars of the stone-gathering machine referred to in a previous issue. We wrote to the Editor of the *Journal of Agriculture*, South Australia, asking to be placed in communication with the inventors of the machine (Messrs. J. and R. Forgan), and we have now received the following letter from Messrs. Forgan themselves. The letter is dated at Port Pirie, South Australia:—
“DEAR SIR,—A copy of a letter from yourself to the Editor, *Journal of Agriculture*, Adelaide, has been forwarded to us, in which you ask for price and particulars of a stone-gatherer made by us. We are prepared to supply these machines in any quantities for £50 each f.o.b. Port Adelaide.

“The machine is built on a V-frame of T-section steel. The bodies or tines are fitted with our patent automatic spring relief draft, this being a close-coiled expansion spring 14 in. long x $1\frac{1}{2}$ core x $\frac{3}{8}$ steel, which is adjustable to any tension, and has a roller attachment that works up and down on the body, taking the tension off the tine when jumping, thereby preventing strain on the implement or horses. In addition to being a gatherer, this machine is easily converted into a cultivator of 13 tines, cutting 7 ft., by taking out two bolts in each body, removing the gathering attachments, and fixing on a cultivator share. The machine clears 10 ft. when used as a stone-gatherer, is very strongly built of steel throughout, and is light of draft.”

A Bulletin of Entomological Research.

Those of our readers who are interested in entomology may like to know that the Committee of Entomological Research for Tropical Africa has commenced the issue of a Bulletin dealing with the results of their investigations, which it is proposed to publish in four or more parts per annum. The subscription for the first year has been fixed at 10s., which should be forwarded to Mr. Guy Marshall, the Scientific Secretary to the Committee, at the British Museum of Natural History, Cromwell Road, London, S.W. The Committee, which is working under the presidency of the Earl of Cromer, is composed of the following experts in tropical medicine and entomology:—Lieut.-Col. A. Alcock, C.I.E., F.R.S.; Mr. E. E. Austen, of the Natural History Museum; Dr. A. G. Bagshawe, Director of the Sleeping Sickness Bureau; Dr. J. Rose Bradford, F.R.S., Secretary of the Royal Society; Colonel Sir David Bruce, C.B., F.R.S., R.A.M.C.; Dr. S. F. Hanner, F.R.S., of the Natural History Museum; Dr. R. S. MacDougall, of the Board of Agriculture;

Sir John Macfadyean, F.R.S., of the Royal Veterinary College; Sir Patrick Manson, K.C.M.G., F.R.S.; Mr. R. Newstead, of the Liverpool School of Tropical Medicine; Prof. G. H. F. Nuttall, F.R.S., of the University of Cambridge; Prof. E. B. Poulton, F.R.S., of the University of Oxford; Lieut.-Col. D. Prain, C.I.E., F.R.S., Director of the Royal Gardens, Kew; the Hon. N. C. Rothschild; Mr. H. Scott and Dr. A. E. Shipley, F.R.S., of the University of Cambridge; Mr. S. Stockman, Chief Veterinary Officer, Board of Agriculture; Mr. F. V. Theobald, Agricultural College, Kent; and Mr. C. Warburton, of the University of Cambridge.

Home Pasteurisation of Milk.

During the summer months, as a precaution against premature souring and against danger of transmittal of disease, milk, especially such as is to be used for children and for invalids, should be pasteurised. Most householders sterilise the household milk by simply boiling it, but to get the best results milk should be properly pasteurised. This can quite easily be done in the house, and we take from a recent Farmers' Bulletin of the United States Department of Agriculture a description by Mr. L. A. Rogers, of the Bureau of Animal Industry, of a simple process by which pasteurisation may be effected. Says Mr. Rogers:—Milk is most conveniently pasteurised in the bottles in which it is delivered. To do this use a small pail with a perforated false bottom. An inverted pie tin with a few holes punched in it will answer this purpose. This will raise the bottles from the bottom of the pail, thus allowing a free circulation of water and prevent bumping of bottles. Punch a hole through the cap of one of the bottles and insert a thermometer. The ordinary floating type of thermometer is likely to be inaccurate, and, if possible, a good thermometer with the scale etched on the glass should be used.

Set the bottles of milk in the pail, and fill the pail with water nearly to the level of the milk. Put the pail on the stove or over a gas flame and heat it until the thermometer in the milk shows not less than 150 degrees nor more than 155 degrees Fahr. The bottles should then be removed from the water and allowed to stand from twenty to thirty minutes. The temperature will fall slowly, but may be held more uniformly by covering the bottles with a towel. The punctured cap should be replaced with a new one, or the bottle should be covered with an inverted cup. After the milk has been held as directed it should be cooled as quickly and as much as possible by setting it in water. To avoid danger of breaking the bottle by too sudden change of temperature, this

water should be warm at first. Replace the warm water slowly with cold water. After cooling, milk should in all cases be held at the lowest available temperature.

This method, Mr. Rogers concludes, may be employed to retail the souring of milk or cream for ordinary uses. It should be remembered, however, that pasteurisation does not destroy all bacteria in milk, and after pasteurisation it should be kept cold and in a cleanly manner and used as soon as possible. Cream does not rise as rapidly or separate as completely in pasteurised milk as in raw milk.

The Morgan Horse.

An attempt is being made in America to revive what is known as the Morgan breed of horses. Fifty years ago and more the Morgan was a favourite amongst those who appreciated fine conformation, style, and endurance, and did not care so much for speed. In those days "Morgan stallions were received in the show rings of Kentucky with enthusiasm. Yet during the last twenty years"—we quote from a Circular (No. 163) recently issued by the United States Bureau of Animal Industry—"the name of Morgan has been anathema among the horse-breeders of Kentucky, the breed has been rarely seen in the show ring at State and national fairs, and the live stock Press and many horse-men of authority have declared the Morgan to be an extinct race." Remarking upon the causes of this remarkable decline in a breed of horses of outstanding merit, the Circular before us remarks that, up to the time that the mania for breeding extreme speed in harness horses manifested itself, the qualities of conformation, style, and endurance which the Morgan possessed were generally appreciated, and it was recognised that in the long run those qualities were worth more money than speed records. With the track records of Etham Allen and Daniel Lambert before them, however, Morgan breeders began to think that the Morgan could be made a racehorse, and the speed craze struck them. The decline of the Morgan horse, the Circular says, may be dated from this time.

Considerations in Pig-raising.

A recently-issued Farmers' Bulletin of the United States Department of Agriculture contains a useful summary of conclusions which have been arrived at as a result of experiments in connection with the raising of pigs in the Southern States, the climate and general conditions of which, we believe, correspond very closely with those of Natal. The summary reads as follows:—(a) Hogs cannot be raised profitably on maize alone.

(b) While pork can sometimes be made at a profit when maize is supplemented with nothing but the concentrated feed, still it is not wise to use concentrated supplements alone. (c) Hogs can be produced cheaper when pastures are used along with the grains than when grains are used alone. By means of pasture crops pork can be made cheaper in the South than it is possible to make it in the maize belt. (d) The advantages arising from the use of pastures are: (i) Pork costs only one-half as much when pastures are used as when concentrated feeds alone are used (ii) the soils are improved very materially as a result of growing the legumes for the hogs and feeding extra grain to the animals; (iii) the crops are harvested (through the hogs) without danger of loss from rains and without expense; (iv) the hogs are under favourable health conditions; therefore losses from disease will be lessened.

A New Discovery.

A cutting has been forwarded by the Acting Trades Commissioner for South Africa in London, from the *Daily Mirror* of the 10th October, relative to a new scientific process for accelerating the growth of wheat discovered by Mr. J. J. Melville. It is claimed that by this process, which affects the germ of the wheat, and other seed, the life force of the seed is trebled, and it is possible to get two crops a year off the land. The process is a secret at any rate for the present, but the Trades Commissioner is endeavouring to obtain more definite particulars. The *Daily Mirror's* correspondent at Burnham-on-Crouch, describes a striking experiment which has been made in connection with this new process, as follows:—"I have to-day seen a field of wheat here, which is, in effect, a revolution, for it is the quickest crops that ever grew in England. . . . This wheat was sown on July 19th of this year, and it will be ready to reap in about a fortnight. To-day it is in full ear, only eleven and a half weeks after it was planted. It has caught up the ordinary wheat sown in spring. In the ordinary way, eighteen weeks elapse from the time wheat is planted till it is ready for reaping. Under this system the period will, it is believed, be reduced to nine weeks. . . . The seed was treated by a new process discovered by Mr. J. J. Melville, a scientist who has been making experiments upon the subject of the vitality of seeds for the past three years. The process he discovered is, however, kept secret for several reasons. Arrangements are being made to treat seed of all kinds—for corn is not the only one benefited—and they will shortly be placed on the market.

"Mr. Suter, hearing of the new discovery, sent some of his own wheat seed to be treated, and, when he got it back, sowed it in one of his

fields, fully three months, according to the established idea, after the season for sowing wheat had gone by. He obtained five witnesses, who made signed statements that it went in on that date. Being country people used to crops, they were very doubtful if the experiment was wise, to say the least of it. But to-day Mr Suter was able to assure me that the wheat is quite as good as that sown in the spring, and that, in addition, owing to the extremely rapid growth of the crop, he was not obliged to weed. 'The seed,' he said, 'was drilled in under the most ordinary conditions, both as regards soil and cultivation. Only five days after sowing the wheat appeared—the usual time is three weeks—and the plants on the thirteenth day were in such a forward condition that the ground had to be rolled. The first ears were out on Friday, 16th September—eight weeks and three days from planting. The land was not specially manured, nor prepared in any exceptional way.'"

The *Daily Mirror* correspondent interviewed Mr. Melville on the subject of his discovery, and the latter's statement is of interest. "The treated wheat was also tried in Saxony," he said, "but it was not planted until July 22nd. Identical results have been obtained. The process of treating the seeds," he proceeded, "takes three weeks, and it affects the germ of the wheat or other seed, and trebles the life-force naturally contained in it. The force I introduce reduces the seed to a more negative (electrically speaking) state than it is normally. I regard the ordinary seed as being in an unduly positive condition. Nature, to alter that, has to take time, and time is money to the farmer. But that is only part of the process, and the rest must remain secret, at any rate for a time. I think it will be possible to get two crops a year off the land: one sown in March, and the other in June. Certainly that will be feasible if one crop is lucerne, and the other a cereal. I do not think I am unduly hopeful when I say that I think in the future wheat will grow in a manner that can best be described as on bushes, and each bush will be from one seed. It will divide the amount of seed needed to be sown by at least three. I made a test with barley, taking one grain. From that one grain I got 3,300 grains on fifty-four stems. The second year they gave one bushel, and in the third year that bushel resulted in forty-five and a quarter bushels, all from one single seed in three years. . . . I can treat any seeds and obtain precisely the same superiority," Mr. Melville concluded.

Inter-Provincial Movement of Swine.

A Proclamation has been issued by His Excellency the Governor-General removing the restrictions imposed by Natal Proclamation No. 20, 1906, upon the introduction of swine from the Transvaal into Natal.

Cane Cultivation in Porto Rico.

A recent issue of the *West Indian Bulletin* (No. I., Vol. XI.) contains an interesting account of a visit to the Guanica Central Sugar Factory, Porto Rico. After describing the methods in vogue in the factory itself, including the manufacture of sugar, the writer proceeds to give some account of the practice followed in the actual cultivation of the cane. We learn that the land is in almost every instance prepared either by steam or by bullock-drawn ploughs. Where the steam ploughs are to be used, as soon as the canes are cut the fallen leaves are burnt and the land is immediately ploughed, harrowed, and then furrowed by means of double mouldboard ploughs. The canes are planted in the bottoms of the furrows about 2 feet 6 inches apart; the water, where they are irrigated, is then run along the furrows. As soon as the young canes are about 18 inches to 2 feet high, chemical fertilisers are strewn on the two sides of the clumps, and a small plough drawn by a mule is used to throw some of the soil from the banks on to the stools. Until the canes are too advanced to prevent their use, cultivators are worked on the banks, in order to keep the fields, as far as possible, from weeds.

Feed Value of Soy-Bean Cake.

The circumstance that large quantities of soy-bean cake were put on the Holland market, the small amount of reliable knowledge available about its real value as a feed, and particularly the unfavourable reports published by one of the Swedish experimental stations some time ago, have induced the Dutch Government to have feeding tests held at one of their own stations, under very special care, in order to establish for themselves the value of the various reports current. For this purpose, we learn from *The American Hay, Flour and Feed Journal*, which contains a review of a report issued by the Dutch Government on the subject, two sets of ten cows each were set apart, care having been taken to have the two sets equaling each other as nearly as possible. The one set was fed on hay and linseed cake, the other on hay and soy-bean cake. The following points are dealt with in the report issued: The manner of feeding; various observations during the experiment; the quantity of milk of both sets of cows; the percentages of fat and dry matter of the milk; the quality of the butter and cheese and their quantity; the course

of the live-weight of the cattle during the experiment; the financial results of both methods of feeding. It was conclusively established that as regards the butter there was no difference between the two products, whether from the soy-bean set or that fed on linseed cake, and the quality approached closely the best Frisian steam dairy butter, considered the best obtainable in this country. As regards the cheese made from milk of the soy-bean set, there was no question about inferior taste, and the quantity in both instances proved the same.

Financially it has been established that soy-bean, when selling at f. 12.16 per 100 kilos, stands equal with linseed cake when the latter sells at f. 12.50 per 100 kilos, and as linseed cake sold this last season at the latter-named price and soy-bean cake at f. 9.50 only, it has been calculated that soya cake at the named difference of price means a saving in feeding of 9 Dutch cents per cow per day. The reports finally conclude that good soy-bean cake means a splendid force feed for milking cattle and that it ranks but little behind linseed cake. The result of the experiments carried on here being so strongly in contradiction with the earlier Swedish trials, it was considered expedient to go thoroughly into the manner in which the latter were carried on, when it appeared that an additional circumstance, *viz.*, the feeding of green feed during the experiments, had afterwards accounted for the less favourable results obtained. Fresh trials, carried on since on a different system of rations, have confirmed the high value of the soy-bean cake.

Government Traction Transport.

Steam and motor tractors having been imported by the Government for the purpose of assisting farmers and others in Natal in the transport of their produce, applications are now being invited by the Director of Transport from persons who have large quantities of goods requiring removal in districts in which the roads and other conditions are suitable for the use of such tractors. The charge for hauling by Government tractors will be, for the present, at the rate of one halfpenny per 100 lbs. per mile. Farmers' Associations and others are requested to furnish particulars of the transport requirements of their districts, and to give full information in connection with each service, *viz.*:—Name of applicant; name of farm; distance from railway station; condition of road; whether there are any drifts to cross; quantity and description of goods to be carted; date transport is required; whether labour for loading and off-loading is available, etc., etc.. On receipt of such information applicants will be advised in due course whether their work can be undertaken, and when. Transport which cannot be undertaken by these tractors

will, if possible, be performed by the Government mule wagons, for which rates will be quoted on application. All applications should be addressed to the Director of Transport, P.O. Box 406, Pietermaritzburg.

An Opinion of the Natal Spray Pen.

The Government Bacteriologist has handed us the following letter which he has received from Mr. H. W. Shaw, of Talavera, York, giving his experience of the Natal Spray Pen. We reproduce the letter here, as it will doubtless interest many of our readers. Mr. Shaw writes:—"I may here state that the Natal Spray Pen erected on Talavera eight months ago is still working well, doing its work in a thorough manner, soaking the beast from head to tail. I consider the force of each spray is doing good work in that each spray has from ten to forty pounds pressure to the square inch. This enables the dip to penetrate well under the hair and search out the ticks. The great advantage is that your dip always remains fresh and at the same strength; when the 400 gallons are used you can mix a fresh supply, and your dip does not get foul the same as a dipping tank. The swing gate works well and is better than bars."

Held Over.

Owing to pressure upon our space this month, due to the publication of the report of the proceedings of the Capetown Conference of the S.A. Agricultural Union, we are obliged to omit our usual "Exchange Reviews" and "Figures for Farmers," which will appear as usual in our next number. We have also been obliged to curtail somewhat our "Science and the Farmer Notes."

His Excellency the Governor-General in Council has been pleased to direct that the administration of the registration and licensing of Natal Veterinary Surgeons under Natal Act No. 21 of 1899 shall be one of the functions to be exercised by the Department of Agriculture.

A remedy for sore eyes in cattle and sheep is given in the *Journal of the Jamaica Agricultural Society*, June, 1909, and is as follows:—Wash the eye out two or three times a day with a solution composed of 1 oz. of boracic acid dissolved in 1 quart of warm water. After three days, apply an ointment made of 1 part of iodoform in 11 parts of pure vaseline, the iodoform being thoroughly mixed with the vaseline until the particles are absorbed in it.

Arsenic in Milk and Beef.

REPORT TO THE NATAL BOARD OF HEALTH.

THE Committee of the Board appointed on 26th August, 1910—"to enquire, investigate, and report (a) whether the use of arsenical preparations for cleansing animals, of which the meat or other products are used by man for food or as the raw material of industries, is, or is likely to be, prejudicial to the interest of the consumer or the workman; (b) if so, to what extent; and (c) if so, what measures should be adopted to abolish or to limit the risk"—now submits its *interim* report:—

1. It appears that the likelihood or possibility of milk and meat becoming impregnated with arsenic, as the result of use of salts of the metal as components or preparations for external application to kill ticks, had not received much or any consideration otherwise than as a possible fortuitous accident, until the issue of a report by the Government Bacteriologist in Natal, entitled "Dipping and Tick-Destroying Agents, Part 2." This is attributable partly to the fact that it was understood that animals generally were dressed only at fairly long intervals, and partly to a general impression that aqueous solutions were not absorbable, to any extent, through unbroken skin, especially in such short application, as is practicable, in the process of cleansing cattle.

2. The Report referred to placed matters in a different light altogether, for not only does it urge the dressing of all cattle at such short intervals as five days, but it discloses evidence that arsenite of soda is absorbed in large quantity by the skin in the process of cleaning, and is eliminated by the urine; and, further, demonstrates that routine dressing results in a storage in the deep layers of the *cutis vera*, upon which it is asserted that its success in tick-destroying depends. The Report shows that even so long as 120 hours after spraying practically 4 grains of arsenic may be recovered from the *cutis vera* of one square foot, and over 5 grains from the scurf and hair covering the same, while it continues to be excreted in the urine certainly up to 72 hours, presumably much longer. This certainly afforded a *priori* ground for expecting that the metal would be recoverable in at least small quantities from the meat, and especially from liver, stomach, and kidneys; and that traces might be found in the milk. It was, however, *prima facie* unlikely that it would be found in any important proportion in the latter, because it was known that the Nel's Rust Dairy, which a very large business in Durban, had been using "Laboratory Dip" at short intervals for a long period, and nothing had happened to suggest that the consumer had in any way been prejudiced. Against this, however,

needed to be off-set the fact that this dairy derives much of its milk from other farms, many of whom use no dip or cleansing process at all, and perhaps few use it at short intervals. In the matter of meat it appears that, for the most part, animals which are sent for slaughter have not been subjected to any regular cleansing at short intervals, and the fact that no harm had yet resulted from eating of meat was no guarantee that harm would not result if the process should become general.

3. A few days after your Committee was appointed articles on the subject and letters appeared in the newspapers, the former largely based upon information and speculative ideas obtained from a medical practitioner in Pietermaritzburg, and popular apprehension was aroused.

4. Your Committee deems it fortunate that it is able to demonstrate that the apprehension was groundless.

5. Your Committee held two meetings, the first to decide upon its course of investigation on August 30th; the second, on September 22nd, to consider the results of its inquiry and to formulate a Report.

6. Your Committee determined that the only suitable means of ascertaining whether the products of animals treated with arsenical preparations for destruction of ticks are likely to be prejudicial to the consumer is by analysis of a sufficient number of samples for the presence of arsenic, and, if arsenic is found to be present, to ascertain the ratio to a given quantity of the products.

7. Your Committee accordingly arranged to obtain from the Nel's Rust Dairy daily samples of milk from ten specific cows, so as to secure it both before and after treatment of the animals, and to obtain from a butcher, who had purchased some fat stock from Nel's Rust Estate, the kidneys, and a portion of the liver, stomach, and muscle substance—in one instance on the day succeeding, and on the other seven days after treatment by dipping.

Dr. Murison also undertook to have analysis made of milk obtained from various purveyors in Durban. The Town Clerk of Durban furnished to the Committee a report from the Chief Sanitary Inspector, giving the results reported by the Borough Analyst.

The Government Bacteriologist has also put in a statement showing certain other observations which have been made by him or on his behalf.

MILK.

8. The reports of the Government Analyst of analyses of milk show that 78 samples were analysed:—

A. 1 bulk sample from Model Dairy, Durban.

B. 2 bulk samples from Natal Creamery, Pietermaritzburg.

- C. 45 samples obtained, one from each of five identified cows, on each of nine days, from Nel's Rust Estate, at intervals of from 32 hours to 7 days after dipping.
- D. 30 samples obtained, one from each of five identified cows, different from "C," on each of four days, and two on a fifth day from Nel's Rust Estate, at intervals of from 7 to 160 hours, after dipping.

observations showed that, when 1/500 part of a grain was added to 200 Reinsch's method, and no trace of arsenic found, although control observations showed that when 1/500 part of a grain was added to 200 cubic centimeters of milk its presence was readily revealed. The results in some instances were checked by the Gutzeit method, and though some reaction was obtained on three occasions, the result was equivocal, and if the reaction was caused by the presence of arsenic the quantity was less than 1/330000 part of a grain in a tumbler of milk.

9. Your Committee has been furnished by Mr. Joseph Baynes, of Nel's Rust, with a statement that he has dipped all his stock regularly since 1902, but for some years only once a month; that formerly he used "Queensland Dip" (composition unknown to your Committee), but since September, 1909, he has employed the "Laboratory Dip" every five days from September, 1909, to February, 1910, and thereafter to date, once in every seven days.

Your Committee is informed that Laboratory Dip contains 0.169 per cent. of arsenic.

10. The report of the Durban Borough Analyst shows that six samples were obtained from five purveyors, one of whom uses Laboratory Dip and one arsenite of soda once a week; two use Erkenbrach's Dip once a week, and one this same dip once a fortnight. In one instance only was a trace of arsenic too small to be estimated in quantity revealed. In this case the udders had been washed with dip on the preceding day, and another sample taken a week later gave no reaction. The processes of analysis used were Reinsch's and Gutzeit's.

11. Your Committee is of opinion that the faint traces, if any, discovered were probably due to fortuitous contamination with arsenic rubbed off the hair and skin.

12. Your Committee, therefore, concludes that the use of arsenical dips at short intervals does not result in the appearance of arsenic in the milk, and that the practice is entirely devoid of danger to the consumer.

13. Your Committee is unable to treat seriously the statement that arsenic was found in higher ratio than 1/100 part of a grain to the gallon of milk or the 1 lb. of meat. It is indeed impossible that the deposit which was found on copper wire was of arsenic, but in view of

the numerous analyses which we have made with negative results, we can only account for this by the probable presence of arsenic as an impurity in the reagents used.

MEAT.

14. The report of the Government Analyst shows that no trace of arsenic was found in 100 grammes (about $3\frac{1}{2}$ oz.) of tripe, liver, and kidneys of each of two beasts from Nel's Rust Estate. Seeing that he states that the processes employed would reveal $\frac{1}{5000}$ part of a grain in 200 cubic centimeters of milk (approximately $\frac{1}{2000}$ part of a grain to 1 lb.), it may be said that arsenic is not to be found in these organs of a beast. The analyses of muscular tissue are not complete, but it would certainly be anticipated that, if anywhere, arsenic would be present in liver and kidneys.

15. The statement of the Government Bacteriologist indicates that even when, in addition to regular dipping and spraying with Laboratory Dip, arsenic is injected into the veins in such large quantities as 24 grains in seven doses in the days immediately before death, although the metal is present abundantly in the urine, it cannot be recovered from the liver or muscular tissue, and only in quite equivocal reaction even from the kidney substance.

16. Although your Committee is satisfied that there is no ground whatever for apprehension that the consumer will be in the slightest degree prejudiced by the meat of animals dressed with arsenical dips, it does not feel justified in making a positive statement that arsenic is not present in the muscle substance until the analyses are completed.

17. Although your Committee did not anticipate that arsenic would be found in anything but exceedingly minute proportions in the products of treated animals, it has come as some surprise that no vestige is to be found in the milk, when it is a matter of common knowledge that many drugs and articles of food readily affect the menstrary secretion, and still more that no trace is discoverable in the meat, even at the very time when its presence can be demonstrated in the urine, to gain which it must have passed through the general circulation. This is a matter of great scientific interest, which, however, your Committee has no means to follow up, but does not affect the fact, with which alone your Committee is at present concerned, that it is not found there.

18. Your Committee has yet to determine to what extent arsenic may gain entry to the milk with hair and scurf from the flanks of the cow, and to what extent the arsenic so entering is soluble. It is, however, plain, from the work already done for the Committee, that arsenic does not enter into solution in the milk in this manner constantly, and if it does so at all the entry is in the nature of an accident. Any results which might be obtained would not affect the main question.

19. Your Committee has also still under consideration the question of risk in the handling of hides, and proposes to report upon this and the matter of the foregoing paragraphs at the next meeting of the Board.

20. Your Committee cannot conclude this report without expressing its very great indebtedness to Dr. Murison, Medical Officer of Health for the Borough of Durban, one of its members, for his assistance in loaning the full services of a Sanitary Inspector in his department to travel daily to Nel's Rust Dairy, and to personally see the cows milked, and bring the samples taken to Maritzburg, and to deliver them at the Laboratory. The Committee is entirely satisfied with the manner in which Mr. Smith performed the duties, and suggests that the Board signify its appreciation to him through the proper channels.

21. Your Committee is pleased to be able to place on record its opinion, arrived at after the most careful investigation, that the rumours and statements that have appeared in the public Press on this subject are absolutely without foundation.

On behalf of the Committee,

JAMES HYSLOP, Chairman.

Durban, 22nd September, 1910.

The above report, which represents an altered copy of the Committee's draft, was adopted by the Board at its meeting held in Durban on 23rd September, 1910.

D. ROBB, Secretary, Board of Health.

MORE LIGHT IN COW HOUSES.

Everybody admits the advantages, so far as health is concerned, of an out-door life, but just how much is due to fresh air and how much to the influence of sunlight it is difficult to say. Sunlight is, however, known to be one of the most powerful, as it is one of the cheapest germicides we possess; it, therefore, should be admitted freely into all buildings occupied by stock. It is a matter of indifference whether it comes from the walls or roof, provided it is ample and does not fall directly on the eyes of the animals. Of all the details connected with cow-houses, few of them have received so little consideration as that of lighting. This omission has been in part due to the erroneous belief that stock fatten quicker in the dark than in the light; but, in any case, nothing will contribute so much to cleanliness in the cow-house as plenty of light. It costs little, and its value there is great, if it were for nothing else but to afford an opportunity of seeing the dirt.—*Journal of the Board of Agriculture (England)*.

Dairy Cattle—Their Types and Management.

By E. S. DAVIES.

(A Paper read at the Orange Free State Agricultural Judges Association Conference, July, 1910.)

THE first difficulty that struck me on commencing to think out this paper was—how to define dairy cattle, and my memory reverted to our last annual meeting when Mr. Bradshaw divided cows into three classes, viz., those that made beef with the food they consumed, those that made milk with it, and those that made the Lord knows what with it. The first kind of cow is a good beef cow, the second is a good dairy cow, and the third is useless. Or to put it in another way and more politely, the first two kinds are the kind for the poor farmer to farm with—they will gradually enrich him; the third kind might suit the rich man—and they would rapidly ease him of his superfluous wealth. Dairy cattle, then, are cattle, the females of which have acquired—through the influence of selection in breeding, of management and of environment, the function of yielding large quantities of milk in excess of the requirements of their young, and the faculty of turning into milk large quantities of nutriment in excess of what is required for their bodily maintenance and indeed, often at the expense of their bodily maintenance. Strictly speaking, there is only one type of dairy cow, i.e., it has been settled by observations that practically all good dairy cows conform more or less closely to a certain physical conformation. As the beef type of cow is blocky, and, roughly speaking, square, the dairy type of cow is angular and wedge-shaped, whether looked at from above or front or rear. A knowledge of the physical conformation common to all great dairy cows is important as it is the only visible sign of a cow's fitness for dairy work, and a safe but no impossible guide in selection. It gives the keen observer also an insight into a cow's temperament and constitution vigour. Good dairy cows are to be found in all breeds and all colours, but there is seldom any serious departure from the accepted dairy conformation. A dairy cow should carry her head well up, and it should be strongly set on a fine, flat, but by no means weak neck, fitting firmly on to the shoulders. The throat and underline of the neck should be clean cut and lean. A heavy dewlap is undesirable, so is a fleshy brisket. The shoulders should be well defined, then at the withers broadening to the forearm (wedge-shaped, in fact) and set obliquely.

Her body should be both long and deep, depth through the chest ensuring good development of heart and lungs, deep and long in the barrel to ensure development of the digestive organs and the foetus, back lean and well defined, not necessarily as straight as a ruler, ribs well sprung, and wide apart. Strong loin, hips broad and lean, rump long and broad, pelvic arch well defined, and tail set on high, tapering and with a good switch. The thigh should be broad, lean, and well set down; the flanks thin. The udder should be large, certainly, but more important, it should be broad and strongly attached to the body, not fleshy, going well forward towards the navel and full and high behind. The pendulous type of udder is undesirable. The teats should be of medium size, tapering slightly, and set square on the udder, with plenty of working room between them, and not white. If the udder is full, they should incline slightly outward. The milk veins should be large, tortuous, running well forward on to the chest, and branching freely over the sides of the udder. I give here a scorecard of points for judging a dairy cow, as approved by the U.S. Department of Agriculture.

General Appearance:

Constitutional vigour, shown by size, health, strength, and activity	5
Form.—Wedge-shaped, viewed from front, top, and side	5
Quality.—Hair full and soft, skin thin, firm, loose mellow oily touch, with yellow secretion	5
Temperament.—Active and nervous (not wild) as shown by movements of eyes, and appearance	5
Forehead, broad and full	2
Horns, small and fine, not too long, set well apart	1
Eyes, large and prominent, bright, but placid	1
Face, lean, not too short, straight or slightly dished	1
Muzzle, clean and strong, mouth and nostrils large	1
Ears, medium size, fine texture, with abundant yellow secretion	1
Neck, long, thin and fine, clean throat and light dewlap	1
Chest and Brisket.—Broad, strong low, and not fleshy	3
Withers.—Well defined, firm and lean	1
Shoulders, tight, not fleshy and oblique	1
Legs.—Straight, short and fine bone (with broad and muscular forearm)	3
Back.—Well defined, lean, open jointed, not too level, strong spine	3
Barrel.—Long and large, ribs broad, well arched, open and well defined	8
Heart girth.—Large and deep	4
Belly, large, broad, deep, strong navel	6

Loin.—Broad and strong	3
Hips.—Wide apart	2
Pelvic arch.—Prominent and strong	3
Rump.—Long and wide	2
Tail.—Long, fine, set high, good switch	1
Thigh.—Long, lean, no beefiness, thin flanks	3
Legs.—Straight, short, wide apart, fine bone	3
Fore-udder.—Full, broad, going well forward and not fleshy	8
Hind-udder.—Full broad, and going high behind, not fleshy	8
Teats.—Medium size, conical shape, evenly placed, not white	5
Milk-veins.—On udder and before it, large tortuous, ending well forward in large milk wells	5

Total points 100

Although, as I have stated above, all dairy cattle are of one type, strictly speaking, and although excellent dairy cows are to be found in most, if not all, breeds, still, dairy cattle are to be found chiefly in certain well-defined breeds, in the animals of which breeds dairy excellence is the chief, the only, consideration. The best known among these breeds, and probably the most important, are the Frieslands, Ayrshires, Guernseys and Jerseys. To these might be added the brown Swiss and the Kerries. Mention must also be made of the Shorthorns, as there are certain strains or families among them of good dairy type, but as a breed the Shorthorns are decisively a beef breed. Ayrshires, Guernseys and Jerseys are small breeds, the cows in good condition being under 1,000 lbs. live weight, Jersey cows in many instances going below 800 lbs. Friesland are medium (1,000 to 1,200 lbs.) weight, and large (up to 1,600 lbs. live weight). Kerries are very small brown Swiss medium, and such Shorthorn cows as are of the dairy type, medium to large. The Frieslands yield large quantities of milk poor in fat, *i.e.*, testing about 3.5 per cent. The Guernseys, Jerseys and Kerries, moderate quantities rich in fat, *i.e.*, from 4.5 to 6 per cent., the Ayrshires and Shorthorns, fairly large quantities of average milk, from 3.8 per cent. to 4.2 per cent. I have never seen an analysis of brown Swiss milk. Coming to the question of management, it is necessary to bear in mind the influences that have been at work improving the dairy type of cow, and that are still at work improving her. Function is largely a matter of breeding or inheritance, faculty is only acquired through practice or habit, although a habit long continued through several generations may become fixed and to a great extent hereditary. Similarly a function—as milk giving—may be so weakened through long continued disuse or neglect as to be practically lost, as in the case of the Shorthorns of certain families. And here comes in the question of management. The universal system

with us is to suckle the calves on their dams and take the surplus milk. This method is not conducive to either encourage or maintain a high standard of milk giving. Probably no one single influence has had as much to do with the evolution of the modern dairy cows as the practice of hand milking, of stripping the udder twice a day of its last drop of milk. Cows of the dairy breeds have had their material function of milk secretion excited into activity twice a day for generations by human milkers, and as these latter—unlike calves—are voracious in their appetite for milk, and will continue to milk while the cow continues to secrete, she is stimulated to yield to the full extent of her ability. Again the effect on heifer calves of dairy type of sucking their dams is bad. If the calf gets as much milk as it ought to in order to thrive, it gets more butterfat than is good for it, its milk secreting glands become fatty and weakened and it acquires in its youth a habit of laying on fat, a habit which remains with it when it joins the herd of dairy cows. As for male calves reared in this way I once read a very true and striking remark that an ox reared on butterfat, worth 1s. a lb., starts life with a mortgage on him he can never overtake. Again, where calves suck their mothers, the method of recording a dairy cow's value by weighing and testing her yield of milk is rendered worthless by the element of uncertainty introduced. Next comes the question of feeding. Without abundant feed a dairy cow's milk-giving function is useless or worse, a positive drawback to her. No cow can make milk out of nothing, although good dairy cows will supply the wherewithal off their own bones as long as they can. A dairy cow implies an animal that turns the feed she gets into milk or butterfat, but she must get the feed and the right kind of feed and in proper amounts. The more milk a cow yields the more feed she requires and can profitably consume. It is a mistake to think that the profitable cow is the one that eats the least and so costs the least to keep. The profitable cow is the one that eats heartily and gives milk in proportion. Experience in other countries shows that even between cows of good dairy type there are wide differences in profit-earning capability, and there are scores of well authenticated instances where ignorant dairy-farmers were actually losing money by feeding. The feeding question is an economic one, and the solution lies in finding out which cows pay handsomely for their feed, and which do not. The latter kind have no business in a dairy herd. While it is folly not to feed good cows and give them every encouragement, it is equally folly to feed poor cows. There is no dairy farmer among us, probably, so fortunate as to have none but profitable cows in his herd, and not one, either, so unfortunate as to have no profitable cows. The question is to find out which is which. Do you think you can do so by observation? Do you think that if you stood in your milking kraal every milking time

for the next twelve months, you could spot the cow that yielded the most butter fat in that period, or place your cows in anything like their real order of merit? I doubt it. The dairy farmers of Holland, Denmark, America, and New Zealand, men in comparison to whom we are mere infants in dairying experience, found they could not do it by observation, and so the method of weighing at stated intervals, or even daily, each cow's milk and testing it for butterfat was evolved, originally, I think, in Denmark, whence it has spread, and is still spreading, throughout the dairying world. And it will spread here in South Africa, too. Systematic dairying, though in its infancy with us, has come to stay, and cow-testing will follow as surely and naturally as day follows night, and with the same effect. The dairy farmer in the light of the sure knowledge he gets from his cow chart can feed and manage his cows with intelligence and profit, and avoid the costly mistakes in feeding made by dairy farmers in other countries, when they were still feeding blindly and in the dark as to the capabilities of their cows. Reverting to feeding once more, it is a mistake not to feed the dry cows. A good dairy cow will rarely go dry for more than three months, and this is her chance to repair the wear and tear and waste of tissue of the last milking period, and to lay up a reserve of energy for the next one. I am no great believer in winter dairying. Grass is the cheapest milk-producing food, and I think it pays better to produce most of our milk on grass. But whether we arrange to have our cows' milk through the winter or not, the peculiarities of our season makes winter feeding of dairy cows an absolute necessity. I believe that if our cows—dairy or otherwise—were brought regularly to their calving in good, strong condition and kept so after calving, we should hear much less of skipping which is now so prevalent. To sum up, hand-milking, cow testing, and feeding, are, in my opinion, the principal items of management of dairy cows. They imply what is perhaps a revolution from our present method. But I honestly think that unless they are adopted we had better stick to the native cattle or beef cattle of the dual purpose type, as Shorthorns, Red Polls, or Devons, and leave cattle of the disinctively dairy breeds severely alone.

The best breeders of poultry are careful to select the best shaped eggs from their healthiest and most vigorous breeding stock, and to have not too many hens with one rooster.

When feeding with grain, this should be scattered among some litter in the scratching shed, which should be composed of peat moss, cut straw, chaff, etc., in order to give the birds plenty of exercise, scratching about to find the grain.

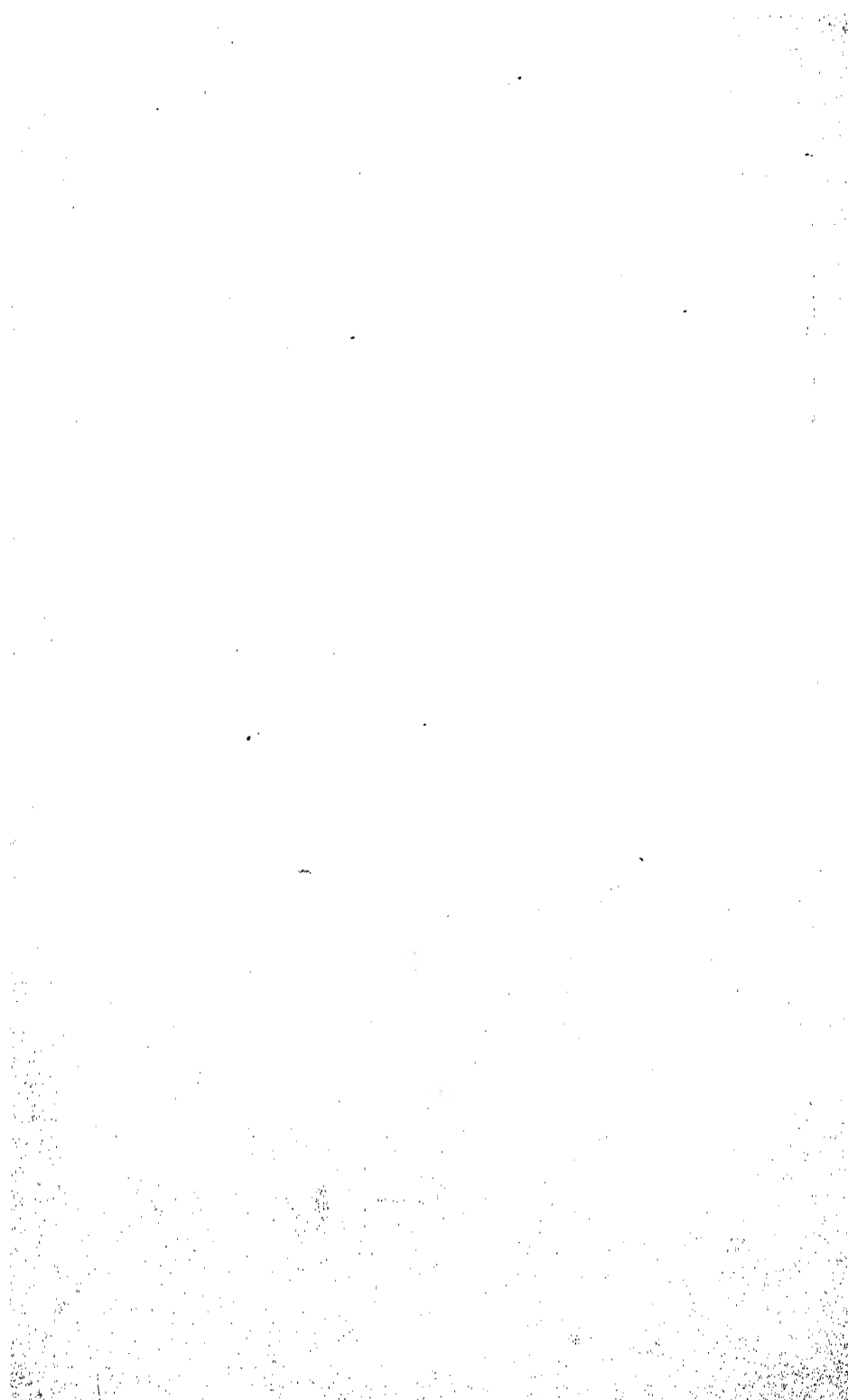


Photo. by]

MACHINE SHEARING VS. HAND SHEARING AT CEDARA.

Showing the Results of two methods of Shearing.

[J. Simpson Ladell.



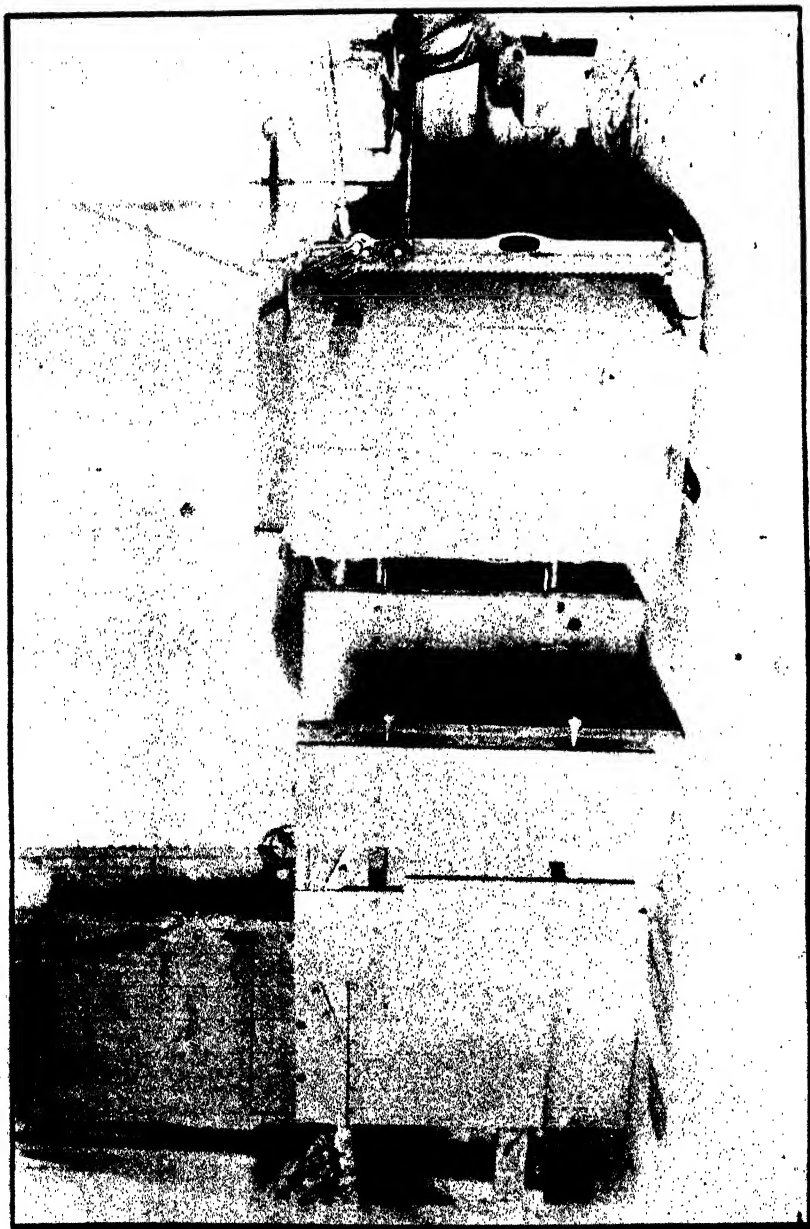


Photo. by]

FARMERS' WOOL PRESS AT CEDARA.
Showing Bale of Wool—weight 350lbs. fleece.

U. Simpson Ladell.



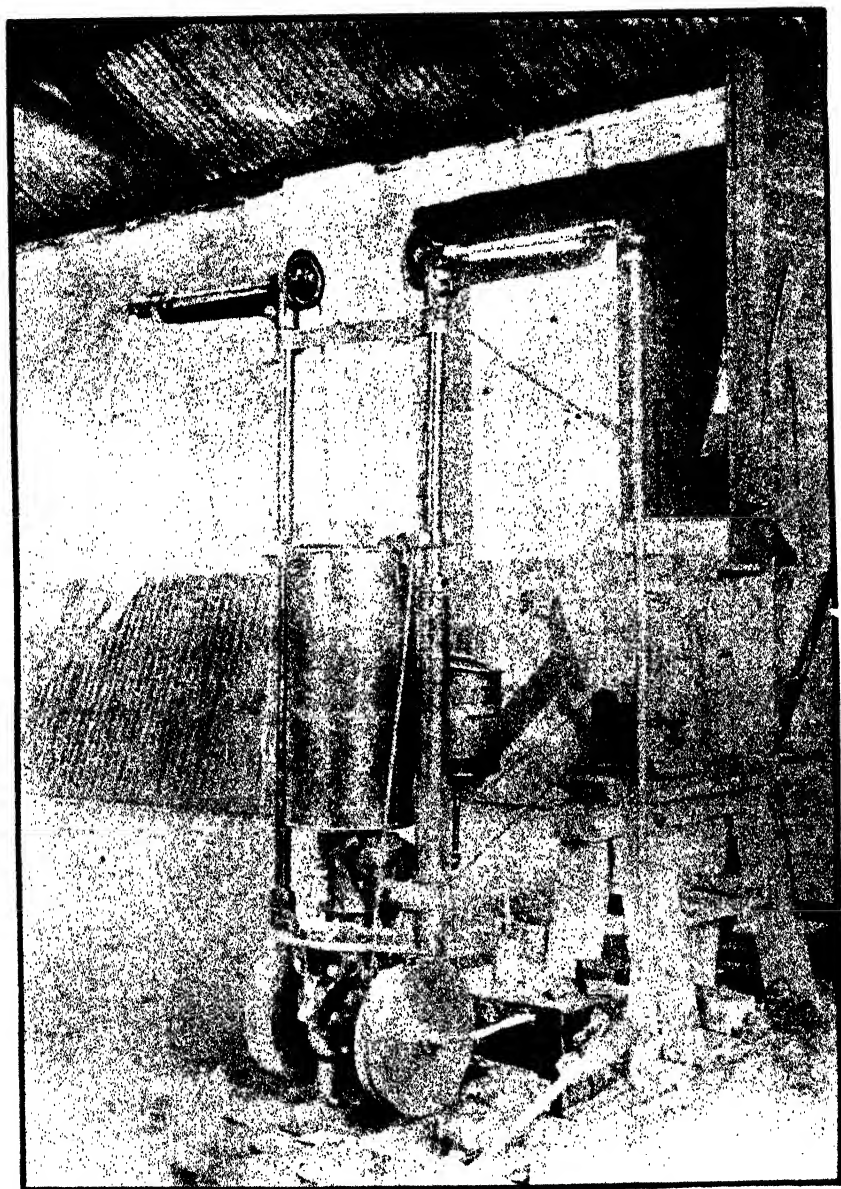


Photo. by]

(J. Simpson Ladell,

SHEARING MACHINERY AS USED AT CEDARA.

Can be used for 2 or 4 Shears.



[J. Simpson Ladell.

SKIRTING A FLEECE.

Students at work at Cedara.

(This and the three pictures preceding have been kindly supplied by Mr. J. McCall, the Government Wool Expert at Cedara. In another issue Mr. McCall will publish an article illustrated with a large number of interesting photographs on Sheep Shearing.)

Photo. by

The Export of Maize.

By H. MOSS.

(A Paper read at the Orange Free State Agricultural Judges' Association Conference, July, 1910.)

I AM very sensible of the honour done to me in being invited to read a paper on the export of maize from South Africa before you. It is my first experience in the role of lecturer in this country, and I sincerely hope that the contents of this paper may prove to be of interest to those present, and of some assistance to those who are concerned in organising this most important industry in the best possible manner. I shall endeavour to be as brief and as explicit as possible, and shall be very pleased to answer questions, or explain details, which are not quite clear to any present. I think that I may claim to speak with some authority on matters connected with the grain trade, having had 18 years' experience in practically every branch of the trade in England, and 8 years' experience in South Africa of importing foreign grain and exporting South African grown grain.

At the outset let me say that the object of my solicitude is the man who grows the grain, it is he whom I desire to see educated in these matters, so that he may understand his opportunities and realise his responsibilities. First of all let me review the work which has been done by Government in creating an export trade, and the effect so far felt in South Africa. In January, 1908, the Government of the Transvaal invited delegates from the sister States to a conference at Pretoria, in order to devise a scheme whereby the export of our surplus grain might be carried out on absolutely uniform lines throughout South Africa, and at uniform charges. I had the honour of attending that conference in the capacity of commercial agent expert to the Cape Colony Government, and was deeply impressed by the determination shown by all parties to draw up a comprehensive workable scheme agreeable to all, and by the masterly manner in which great difficulties were surmounted. After two days' hard work and mutual concession, a thoroughly workable scheme was evolved whereby exporters were henceforth enabled to rail grain 500 miles or more to the coast port, and ship it thence to Europe, at an all-round charge of 2s. 6d. per bag of 203 lbs. This scheme was a really wonderful achievement, having for its sole object the welfare of the farmer. Doubtless some of you gentlemen present recollect seasons 12 to 20 years ago when practically every one in the country had fine crops

of maize at one time, and it was found impossible to sell the surplus for more than 2s. per muid sack, owing to the fact that there was no outside market available: such times are not likely to occur again, now that we have an unlimited market available for our surplus, thanks to the spirited and generous action of a wise far-seeing Government. It must be borne in mind that the price obtainable for our surplus grain is a most important matter since it practically determines the market price of the total crop, thus if foreign buyers are prepared to pay 12s. per bag for our grain, the whole of the crop is worth fully that. During 1908 and 1909 prices in Europe ruled high, consequently the realisable value of our surplus kept up the price of the bulk of the crop. During the last four months, however, a sharp fall in prices in Europe has occurred, and unless a recovery takes place shortly we shall find that our crop this season is less valuable than last by 1s. 6d. to 2s. per bag. The cause of the fall in prices was lower prices in U.S.A., and free marketing of a large Argentine at a time of the year when the European demand is very slack. Present prices indicate about 6s. per bag of 203 lbs. on rails Bloemfontein as the average value of our crop to-day, and as this price is getting perilously near to the cost of production, I think you will agree with me that, as our export trade is beyond the experimental stage, we should spare no effort to thoroughly perfect the conditions of our trade, and so improve our methods as to attain a position to recommend the utmost intrinsic value for our maize on foreign markets. You will infer from this statement a suggestion that at present we do not obtain the full value of our maize on European markets; and I have no hesitation in stating that in order to sell a parcel of good maize on "C.I.F. certificate final" terms, we shall have to take less than the full intrinsic value of the grain. There are more reasons than one for this. In the first place the reputation of our Government certificate suffered severely last year; secondly, our grain is but little known in the big markets, since, owing to the smallness of our output and the multiplicity of our grades, the big merchants will not be bothered with it. Last season I recommended certain exporters not to sell their maize afloat on certificate, but to wait until it reaches its destination, and could be sampled by buyers. This course was followed and much higher prices were realised than the shippers expected, although there had been no quotable change in the market. The fact was that those particular parcels realised the full value of the grain, which was 1s. 9d. to 2s. per 480 lbs. higher than the ordinary advertised C.I.F. price. I have kept in close touch with my old friends on the English markets throughout, and have asked several of those in a very big way of business why they did not trade in South African maize: in each case the reply has been the same, viz.: "If you want us to enter the market for South African grown maize you must

organise your trade; at present we do not know we shall receive on your certificate; cut down the number of your grades; certificate only really good quality clean maize; let us be assured that when we want cargoes or parcels of say round yellow maize, we shall receive maize good enough to pass our forward contracts without fail; then we will come into your markets." Here we have a clear expression of opinion from people who should be our best clients, and who are quite ready to deal with us on the best terms to ourselves, if we supply them with that which they require, in the manner in which they require it. It appears to me that we are striving to be up-to-date in every branch of our agricultural work, and it surely behoves us to be specially up-to-date in details relating to our dealings with our customers in commercial matters of such immense importance to us as our export trade in grain. Should the price of maize on foreign markets fall a little lower, we shall find there is little or no margin of profit between the cost of production and the price at which we can realise; when such a position arises we shall appreciate very keenly the value of extracting the last fraction possible for our maize from our buyers, and it may so happen that by improving our methods we shall be enabled to secure that last fraction and so show a profit on the season's crops. We can grow the best maize in the world, and it will be our own fault if we do not organise our trade and improve our methods so as to command the best prices on the market. Do not forget that a small matter of 3d. per bag on, say, three million bags, means a difference of nearly £40,000 one way or the other, and it is well worth keeping in the country. (Hear, hear.) The status of the graders at the ports is a matter which demands very serious consideration, and I sincerely hope it may be taken up by Government at an early date and placed upon a sound footing. At the present moment there is only one grader who devotes his whole time to the work of grading and who receives a fixed salary; at the other ports the graders are men who are engaged in business on their own account, and who do grading work when required at so much per day. When you consider the vast importance to the export trade of absolute confidence in the integrity of our Government certificates, on the part of the foreign buyers, I think you will conclude that the graders should be solely Government servants. Our Government certificate should be such that foreign buyers will accept it eagerly, knowing it to be a reliable guarantee of quality and condition, issued by a grain expert placed above suspicion by virtue of his office, his personal character and his salary. (Applause.) Another important point is the multiplicity of our grades: we shall never induce the foreign corn trade papers and lists to quote our grain so long as we have 12 grades; the big firms in the trade will not be troubled with them, when Argentine ships entirely one grade and that a first-rate one: and other

countries, with treble our output, offer only one standard of quality. There is no reason why we should not ship out of the country any and all kinds of mixtures uncertified and unclassified. Merchants can sell them on their own samples, but let our certificated classed grain be very good and the classes few in number. Farmers will soon realise that maize, uniform in character, appearance and colour, well prepared for market, is a better asset under all conditions than the extraordinary mixtures with which we have to deal at the port of shipment only too often. I can assure you that a small parcel of say 200 bags has been known to comprise large white flat, small round yellows, small pointed yellows, small round whites, flat and round blue grains, and round blood red grains, plus about 15 per cent. of broken grain, husks and bits of cob, as well as sand in quantities. For my own part I should like to see our certificated round yellow and flat yellow maize of such good quality as to pass as "contract corn" of the English markets, and I will try to make it clear to you why. On the Liverpool and London markets there is always business being done in maize and wheat options or futures.

Two kinds of maize options are dealt in, viz., Flat American mixed, and Round Yellow, chiefly Argentine. An option consists of 5,000 centrals (2,500 bags) and can be bought or sold for delivery during any month desired for about nine months ahead: that which is dealt in is contract corn, on delivered terms. It is tenderable to the buyer on any day during the month contracted for. The buyer knows exactly what he will get when he buys, consequently, maize fully up to the standard of contract corn, has a distinctly enhanced value over maize slightly inferior to it. These options serve a very useful purpose, are very largely utilised for covering purposes, besides being the most sensitive indicators of the state of the market. The fact that contract corn is always the most saleable kind of maize in large lines causes it to realise top prices. I do not mean to say that under any and every condition contract grain always realises the highest price of any kind on the market, for it does not. For instance, there may be a sudden sharp demand for choice white flat maize, and only a very small supply. In this class a fancy price may be realised for that which is available; yet when that special requirement be fulfilled, and a large parcel be offered for immediate sale, it may prove to be a matter of much difficulty to find a buyer even at a much lower price, owing to its not being an every day and all day trading line. Round yellow or flat yellow maize of contract quality is readily saleable at all times in enormous quantities at fairly staple prices. I fully expect to see a grain market held regularly in Bloemfontein ere long, and maize dealt in very largely on the monthly delivery principle; when that time comes we shall not want more than about three or four grades, I can

assure you. At the beginning of this paper I stated that the chief object of my solicitude was the farmer. But there is another party with much to say on the export subject, and that is the merchant. Well, gentlemen, I submit that merchants can take care of themselves, and do not require the care and assistance of the Government in the same way that the farmer does. As a matter of fact there are certain merchants in South Africa to-day who would like to see Government control removed from the maize export trade for it would prove to be a much more profitable business to them if there were no graders and no standards; they could then arrange matters with their European agents, sending their own samples on which to sell, and could make their own terms with the farmers who would have little or no idea what was going on. Under these circumstances the small merchants who might like to export maize would be placed at a great disadvantage since they would be unable to work such business satisfactorily owing to want of capital. Under present conditions it is exceedingly difficult for any merchant to make a very large profit out of this trade without undertaking undue risks in the way of speculation. Meanwhile merchants serve a most useful purpose, for they are the distributors of the grain and in the course of their business they realise enough profit to make it worth their while. Of one thing I am confident, that the merchants are the proper channels through which distribution should be effected if the best results are to be secured. I have met with large growers of grain in this country who state that they will ship their grain to London or Antwerp for sale through their own brokers there, but I always point out our merchants here are in touch with the consumers of the grain in every centre in the British Isles, France, Holland, Germany and Norway, consequently they are in a better position to give the best price on the spot, for they know which market is most in need of grain. Suppose a farmer having 5,000 bags of fine maize had shipped the same to London early in May, it would have struck a very bad market indeed and would have realised fully 2s. per bag less than could have been obtained here for it previous to shipment. Merchants do not make such huge profits out of business of this kind as many people think, and it frequently happens that a bare profit of 2½ per cent. is all that can be made out of it by exporters. If it were not for the dimensions of the trade it would not pay such people to go into the business when all the risks and the numerous small charges come to be deducted from the apparent profit. I do not want you to think that the last part of this paper contradicts statements made earlier on, when I referred to the advice I gave certain exporters last year. The advice in question was given in consequence of the very unsatisfactory state into which this trade had drifted. I maintain that the growers of the grain should sell to buyers on the spot. The latter will most probably sell it,

before they have actually bought it, at a very small profit, to that market whence the best price is obtainable; growers will obtain prompt cash and run no risk of falling markets, bad debts, deterioration of the grain during the voyage oversea, and other contingencies. Merchants are the distributors the world over. In no country in the world is the farmer the oversea distributor of his own produce, and in my opinion the old adage of the shoemaker sticking to his last holds good in this connection. With our grade organised on the most up-to-date lines, our certificates a thoroughly reliable document, our output increased enormously, we shall have the biggest merchants in the grain markets of the world competing for our maize, small men and men in a big way of business all anxious to give the last halfpenny per bag for the farmers' grain, and if they will not give him a high enough price his reply will be "Ik zal mij mielies te markt op vier voet stuur."

WHEN A MARE IS IN FOAL.—The signs by which a mare may be known to be in foal are, as a rule, many and various, but those which so decidedly indicate that state in one may be in part, and in some instances wholly, absent in others. This is especially the case with regard to the outward manifestations. Enlargement of the abdomen, which is such a striking feature of pregnancy, may be hardly perceptible in young mares with their first foal. On the other hand, in old matrons who have borne a number of foals the natural enlargement of the barrel is so considerable that the diagnosis of her condition from this point is difficult and in some cases impossible. If, however, we look beyond this, then changes of a well-defined character are seen in altered temperament as well as in the size and form of certain parts, and, later, in the manifestation of the increased action of particular organs. The mare in foal loses her skittishness, and becomes somewhat dull and restless; there is no return of oestrus. This, however, is not always a sign of pregnancy, and most breeders can furnish examples of mares while in foal mating again, while the date of birth of the foal clearly shows it to have been got at a former service. Mares that are in foal are noticed to become lazy, their appetite increases, and they lay on flesh and take on a perceptibly altered form of the barrel, the lower surface showing a strikingly prominent outline with a tendency to become angular. When at work and receiving a full ration of grain mares do not let down so soon nor so decidedly as others at grass. The bracing influence of condition is more in operation, and the muscles of the abdomen are more tense and give more support to its contents.—(*Agricultural Gazette*, London.)

South African Agricultural Union.

ANNUAL CONFERENCE IN CAPETOWN.

DETAILS OF THE PROCEEDINGS.

PUNCTUALLY at ten o'clock on the morning of Tuesday, 1st November, the Inter-Colonial Agricultural Union of South Africa met at the Chamber of Commerce Rooms, Capetown. The President of the Union (Mr. E. W. Evans, Natal) was in the chair, and the following delegates were present:—

Cape Colony.—Messrs. G. C. Lee, Hon. P. W. Michau, G. L. S. Edmeades, O. E. G. Evans, T. T. Hoole, C. W. H. Kohler, R. H. Struben, J. Starke, R. Watson, J. Noble Jack, W. Rubidge, T. A. Stephens.

Transvaal.—Messrs. W. Pott, F. S. Nicholson, E. W. Hunt, M. Lochhead, W. H. Poulteney.

Orange Free State.—Messrs. G. A. Kolbe, P. Swanepoel, T. Barry, M. J. Joubert.

Natal.—Messrs. E. W. Evans (President), C. H. Mitchell, J. Marwick, Jas. King, Jno. Moon, J. Scott, J. G. Bester, H. Bazley, G. C. MacKenzie, W. J. S. MacKenzie.

Rhodesia.—Messrs. R. A. Fletcher, C. B. Gwynne, C. S. Jobbling, F. Eyles, H. O. Backhouse.

Government Representatives.—Messrs. C. E. Gray (Chief Veterinary Surgeon, Transvaal), J. D. Borthwick (Chief Veterinary Surgeon, Cape), W. M. Power (Chief Veterinary Surgeon, Natal), C. P. Loundsbury (Government Entomologist, Cape), C. Fuller (Government Entomologist, Natal), J. Burt-Davy (Government Agrostologist, Transvaal), Dr. Wm. Macdonald (Dry-Land Agronomist, Transvaal), Dr. Theiler (Government Bacteriologist, Transvaal), J. Pole-Evans (Plant Pathologist, Transvaal), E. O. Challis (Dairy Expert, Cape), R. A. Davis (Horticulturist, Transvaal), F. D. McDermott (Editor, *Cape Agricultural Journal*) and H. J. Choles (Editor, *Natal Agricultural Journal*).

His Excellency the Governor-General of South Africa (Lord Gladstone) formally opened the proceedings. After a few introductory remarks by the President, His Excellency addressed the Conference as follows:—

HIS EXCELLENCY'S SPEECH.

"Mr. President, ladies, and gentlemen, I am precluded from making any speech or statement which could really be worthy of the occasion, or of the business which you are about to conduct, for one reason because of

an engagement elsewhere, which, you are aware, requires my presence in a very short time. In the second place, the work which lies immediately before you is so wide, and, in a sense, so complicated, that, as a newcomer in this country, I certainly should hesitate to attempt to make any lengthy statement to you, who know what is in your mind, and who have had practical experience of the work of this society. Now, I have studied, as well as I can, your report for 1909-10, the resolutions which have been passed, and the replies from the Government authorities which have been received in connection with these resolutions.

"The first point which strikes me, as no doubt it strikes you, is that now you have to do with the Union Government, and I hope that you will not be in too great a hurry in pressing that Government to do everything that you think ought to be done at once, for the reason that, as everybody knows, the four Provinces will be pressing the Government to do everything immediately, and will be vying with each other as to who is to get the ear of the Government. And in the end the Government will not be able to do one-tenth of the work it is asked to perform. I observe that your resolutions deal with over fifty matters of very great importance, and such matters relating, for example, to Customs dues, which would necessarily have to occupy the attention of the Government for a long period, in order to make progress—and it is clear that all these subjects cannot be dealt with by the Government at the same time, and I hope that you, as business men, will concentrate your efforts on what you think ought to be done at once; and not only on what ought to be done, but what can be done, in order to get through the greatest amount of work in the shortest time. I am an old hand at this business, and I know, from very many years' Home experience, that some of the least effective organisations make the greatest show of work, and state their objects in the most bulky form. But that is not what you want; what you want is to see progress made in the direction you want to see it made. Therefore, in this matter, of which I can speak with experience, I hope you will concentrate your programme, without excluding anything which you think necessary, in your minds. I know very well what will happen if you do not. You will get promises made, which will necessarily have to be largely unfulfilled, or ill-considered Bills, which will be worse than useless and open to criticism. (Hear, hear.) You want to get your work done; the Government will have their hands very full, and it is no use having Government Departments and pressing them to do this, that, or the other, and make inquiries, to do which is physically impossible for reasons of time. Therefore, I hope you will concentrate your efforts. I do not say for a moment that you can let your hands rest; there are matters for

which incessant work is required, as, for example, the combating of East Coast Fever and the pests and plagues which are inflicted on the farmers of South Africa. (Hear, hear.)

"Continuing, his Excellency said that he did venture respectfully to say to them that in respect of matters which required legislation and Government action, let them not try for too much; otherwise they would not get nearly as much as what they would get if they organised and concentrated year by year on a settled programme.

"Well, now, gentlemen," His Excellency went on, "you have a great work of organisation before you; you have splendid opportunities. I was delighted to see a telegram two days ago to say that the first cargo of maize had been delivered, in splendid condition, in Mexico—4,500 tons slipped from Durban. And another large cargo reached Canada for the first time this year. In this alone you have an object worthy of your attention. You have an unrivalled position, not only in the production and the harvesting of maize, but the sun is more kind to South Africa than perhaps any other country in the world. This is only one direction in which your energies may be devoted. You have, I take it, now proceeded to reorganise. The old Colonies have ceased to exist, and your Union will have to represent South Africa as a whole. I am delighted that this is so. It is to be hoped, by bringing representatives—thinking representatives—of the farming community in South Africa into a Conference under one name, that they will apply their minds to these problems from the point of view, not only of Natal, the Transvaal, the Orange Free State, or the Cape Province, but as they affect the whole of South Africa. (Hear, hear.)" That is of immense importance—having the farming community not looking at the interests as they affect the four Provinces of the Union, but the Union as a whole. The more you can combine, the more will your concerted action be for the benefit of the whole of the Union, and the more you pull together for the whole of South Africa—that, in my opinion, will be the most profitable way of action.

"Dealing with a communication from his predecessor in office with regard to a proposed Imperial Agricultural Institute, he said that he entirely agreed with the views expressed by Lord Selborne, and that if they thought fit to act on the lines which he had suggested, he (Lord Gladstone), for his part, would gladly communicate with the Secretary of State at Home, in order to promote the formation of the Imperial Agricultural Institute which they had suggested. (Hear, hear.) He could only say that in that way, or in any way in which he felt he could promote the interests of the great Agricultural Society of South Africa, he was at their service, and would be only too glad to do anything which

was in his power. (Applause.) He had much pleasure in declaring the proceedings open."

Lord Gladstone, who was accompanied by his aide-de-camp, received three hearty cheers, and shortly afterwards left.

PRESIDENT'S ADDRESS.

The President (Mr. E. W. Evans) then delivered the following address:—

"It is with no little satisfaction that I welcome you, delegates from the affiliated Agricultural Unions of the four South African States, to this, our sixth Conference. On your behalf I thank His Excellency Lord Gladstone, the South African representative of His Majesty the King, who has graciously consented to formally open our proceedings. General Botha is unfortunately unable to be present, but we can well understand how exceedingly busy he must be with affairs of State, and we know we have his full sympathy and moral support. You are all aware of General Botha's record in connection with the growth of up-to-date agriculture in the Transvaal, and his zeal for its progress, and I may say for you that if in the wider sphere of his present effort that progress is maintained and continued, as we are confident will be the case, we shall be more than satisfied.

"It is fitting that we should meet in this historic and romantically-situated town, where 158 years ago Jan van Riebeeck landed and first laid the foundations of the South African nation, now consolidated and about to take its position as a united people among the loyal dominions of Great Britain. No section of the world's workers needs and benefits by co-operation more than the farmers, and it may be looked upon as favourable omen that we had anticipated the political Union of South Africa by several years, with the confidence and tenacity for which farmers are notable. It may therefore be taken for granted that we here have the profoundest belief in the wisdom which suggested that Union to the far-seeing and patriotic leaders in the various States two years ago, and I am surely echoing the sentiments of those present to-day in saying that we know their efforts are deeply appreciated by all, and will be crowned by steady and increasing prosperity to an extent impossible under previous conditions. Our constitution wisely limits us to agriculture and prohibits politics, but I am well within the bounds in saying that this Conference has the greatest confidence in the present Government fostering in the widest manner possible the true interests of agriculture without reference to State or section. Our Union is now complete by the affiliation of the Orange Free State Agricultural Union during the past year, and I extend a hearty welcome to the delegates of that Province of great pastoral potentialities. We are pleased also to have with us the representatives of

the various Agricultural Departments, without whose aid our deliberations would lack much of their value, and in the discussions to follow their scientific knowledge will be freely drawn upon to enable us to arrive at sound conclusions.

"Without going into detail or wearying you with statistics which can be consulted in their proper place, I may say that the year now ended has been on the whole a normal and satisfactory one, with the exception of the continuance and spread of that dreaded scourge, East Coast Fever. Progress has been noticeable in every branch of pastoral and agricultural pursuits, notably, perhaps, in sheep-breeding by the frequent introduction of valuable animals certain to make their mark on the flocks of the future. But all have been pressing forward—grain and fruit, ostriches, horses, sheep and goats, sugar, maize, wattle, and general agriculture have all made varying, but still satisfactory, advances. It is outside the province of an address like this to go into detail, but it is impossible not to notice the general improvement, the desire for co-operation and the recognition of its advantages, while scientific research is welcomed, and its findings utilised to an extent unknown before. All this points to the agricultural awakening of South Africa, and tells those who are watching the march of events that from now forward the advance will be sounder and greater, and that there is good reason to believe that this sub-continent contains the needful elements to range it alongside the progressive and prosperous Colonies in other parts of the world.

"Agricultural education is, perhaps, our greatest need, not only for the rising generation, but for the man now on the land, the man who is fighting daily with new pests and unexpected difficulties. These must be met by the travelling expert in soil culture, dairying, irrigation, forestry, stock raising, and diseases, preparation of produce in the best way for the best markets, for distances are too great and costs too heavy to allow of a man leaving his home for such training; besides, the farm is the best place to receive and most usefully profit by it. Education of the young, I have no doubt, will be fostered in the best way by some instruction in the principles of agriculture in country schools, and by the establishment of more Agricultural Colleges, and we are fortunate in having many enthusiastic scientists in our country who need no stimulus, having determined not to rest until South Africa is fulfilling her high promises and producing what they know she is capable of doing. One important branch of agricultural education sorely needed is a College for the training of properly qualified veterinary surgeons. Without decrying in any way the Home educated man, it must be obvious to everyone how much more useful the South African vet. would be in this country where our diseases and pests are peculiar, if he had received his scientific education on the spot, among the subjects which he would afterwards constantly encounter.

"There is plenty of evidence to show that much of our land, wisely selected, will carry a much larger white population than at present, and our best efforts must be directed towards that end if we are ever to become a successful competitor in the markets of the world. There is some division of opinion as to the advisability of initiating an immigration scheme at an early date; but it surely will be wiser to first ascertain what land is suitable and available, and what number of our people are capable of usefully occupying it with a reasonable chance of success. In Natal I feel sure both these questions can be satisfactorily answered, and I have little doubt the other Provinces would, in a greater or lesser degree, tell a similar tale. But a commencement must be made, and I would suggest that a Closer Settlement Commission should be early appointed to first of all settle the points I have named. It is needless to insist on the wisdom of increasing the white population of this country; not only is it needed for mutual protection, education and social advantages, but for the prime necessity of producing at a competing price. Until we have accessibility by good roads and railways, to enable us to market our products in face of any competition, we shall not succeed to any great extent, and these facilities are not possible unless the denser population of successful farmers is possible also. Irrigation is a valuable factor in this connection, which requires development, but the dry land culture, which Dr. Macdonald has so ably advocated, will probably be equally important. We who are here assembled by right of selection will carry great weight in the consideration of this most important subject, and in our deliberations we must consider the welfare of all without regard to sectional or local interests. It appears to me necessary, now that we are one country with one Government, to have a Board of Agriculture to confer with and advise the Minister, who cannot possibly know the varying conditions of all the sub-continent. Such a Board should be composed of selected men from all parts, and, I should expect, would be welcomed by the Minister.

"There is one subject which I must touch on, as it is now unfortunately of widespread interest—I refer to East Coast Fever. Your executive's report shows that the committee appointed at last Conference did all that was possible to get a combined fighting policy initiated to especially check the spread of the disease into clean areas, but owing chiefly to the impending change of government, nothing effective was done. To-day the Cape Colony is badly infected, and from our experience in Natal there is little hope of saving Native Territories, where the absence of fencing and lack of co-operation render the control of stock and the enforcement of regulations so difficult. Natal has suffered most severely from this scourge, and had the greatest experience in consequence, and I venture, as Chairman of the East Coast Fever Advisory Board in that Colony, to offer advice to my fellow-South Africans who may be in-

interested in bovine stock. We in Natal have tried many methods of fighting this dreadful plague, and, incidentally, through our losses and failures, learned many lessons. Of these, the most important is that of the value of dipping with arsenical solutions, which, carefully and systematically carried out at short intervals, will undoubtedly check East Coast Fever. We have been waiting for the discovery of some preventative or cure, but even if this should be forthcoming, as we all devoutly hope, dipping is none the less advisable, for it has been proved that the arch enemy of the stock-breeder, the cause of most of the deadly ailments to which his animals are subject, is the tick, and that we can hope to eradicate this pest by this simple and inexpensive means, or at least to so reduce the numbers as to render it a negligible factor. Need I say more, except to hope that public opinion will very soon be sufficiently educated to call for a carefully prepared dipping or cleansing Act for South Africa. Natal is ready now, and time might be saved by introducing it there at once, but, gentlemen, the vital need is to be in advance of the disease—if you have no ticks you can have no East Coast Fever. I hope you will not think my report too lengthy, but the matters of interest to us all are so many and weighty that reference to some of them seems to be necessary.

“The question of the revision of our constitution has been in the air ever since the South African Union movement was first initiated, it being felt that our position would be improved by having direct access to one Government instead of four, and so avoiding the waste of effort which has been unavoidably evident in the past. The needs of farmers throughout all the States, after passing through the cleansing fires of Provincial Agricultural Unions, would be important enough to be brought to the notice of the Minister, and it was evident that a strong and stable representative at headquarters was required. You will have read the suggestions recorded, and will now have access to the criticisms thereon, so that there should be no real difficulty in making sound revision which will put us in close touch with the ruling authorities, and strengthen our status generally. If a committee is appointed to report upon this important matter, I trust that the serious question of finance will be also considered, for our efficiency has been greatly lessened by the inadequate revenue which has had to serve our needs.

“The establishment of a South African National Show, to be held annually at different centres, should receive your favourable notice, as the time is probably ripe for such an innovation. Several large societies have for some time past been anxious to offer their well-equipped grounds for the purpose, and I am of opinion that valuable educational work would be accomplished if the scheme could be arranged on practical lines. It would be of the utmost value if men gathered from all stations of the Union to such a show, there to compare advances made in stock-breeding and soil

productions, to profit by defeat, and learn lessons from victory. By moving yearly from place to place interest would be ever stimulated, and the necessary attendance secured, while lectures would supply the educational requirements, and agriculturists by degrees become acquainted with the productions of all the districts of the Union. The proposal has much to recommend it, and it is for you to decide whether the present time is opportune for the beginning of the work.

"You will have noticed in the executive's report what has been done about Mr. A. G. Robertson's suggestion for an Imperial Agricultural Union. Conditions prevailing during the past year have made it impossible to further the ideas more than has been done, but the conception is a fine one, and we should be proud that it originated in our country. The condition is now such that we may safely expect sympathetic help from the Minister of Agriculture, and next year should see a gathering of representative men from Great Britain and the Colonies to form an Imperial Association, which should be of the greatest solid and sentimental value to all the British Colonies and Dependencies.

"And now, gentlemen, I thank you all for your courteous hearing. I thank the members of the executive, who, under difficult conditions of distance, have always responded to any call upon their time, and who have helped me greatly in the consideration of vital questions. Your Secretary has had a busy year, and deserves your gratitude for his enthusiasm, which never wanes, despite the fact that our unsatisfactory finances deprive us of the pleasure of paying him adequately. I will not detain you longer—you have much work to do, to which this is only a preliminary. My conception of the annual address is that it should, as it were, strike the note for the year, and my word is that we are starting a new era in South Africa, and that we may well be hopeful for the future, having confidence in the great capabilities of our country. We here represent in a concentrated form the opinions of the man on the land, and what we must aim at is sound, educated progress; to that end, it is our duty to see that the Government helps us to help ourselves in every way that a Government can, above all by education for man and child in every modern method, so that we may benefit by every modern device to produce the best article, be it stock or produce, in the most efficient and economical manner. These are times of change and needed; we have advanced steadily from year to year, holding ever by the principle that union is strength, and we may be proud of the results that have followed our steadfast policy. Our power for good will be increased in the future, and I hope that we shall, by our wisdom in debate and soundness of practice, contribute in part to the success of agriculture, which will be largely responsible for the making of a Great South Africa."

Rev. Mr. Scott rose to move a vote of thanks to the President for his very able address, which was received with applause.

Notices of new motions not appearing on the agenda paper were called for, and a number which had been received from the Cape Agricultural Union (whose meeting had been held the previous day) were read by the Secretary.

REPORT OF EXECUTIVE COMMITTEE.

IMPERIAL AGRICULTURAL UNION.

The Conference then proceeded to consider the Report of the Executive Committee.

The following report was submitted by the Executive Committee on the question of the establishment of an Imperial Agricultural Union:—

An important subject referred to us by the 1908-9 Executive was the inquiry into the feasibility of establishing an Imperial Agricultural Union. After full consideration, it was decided to approach Lord Selborne, the then High Commissioner, on the subject. His Lordship had previously encouraged the idea of such a Union. The following is a copy of the letter sent to Lord Selborne:—

6th December, 1909.

The Right Hon. the Earl of Selborne, His Majesty's High Commissioner for South Africa Pretoria.

My Lord,—I have the honour, on instructions from the President of the Union (Mr. E. W. Evans), to continue the subject of an Imperial Agricultural Union first discussed last year with the past President (Mr. Robertson) and the 1908-9 Secretary (Mr. Nicholson). The position of the subject up till the Annual Conference of the Union in September last is reflected in a circular letter sent by Mr. Robertson to the members of Executive and presented to the Conference, a copy of which I have pleasure in enclosing.

The scheme disclosed in this circular had warm support, and the new Executive was instructed to carry it into effect in the most practicable form possible.

It is considered, therefore, that the first step to be taken is to get into communication with all agricultural bodies throughout the Empire, of a character similar to our own Agricultural Union, with the object of obtaining their views on the general question, and inviting their co-operation and representation at a Congress of delegates to be held in Capetown at the time of the opening of the Union Parliament.

As your Lordship has already taken an interest in the subject, the Union believes that you will assist us in our object, and I am to ask you

whether you will favour us with suggestions as to the best method of procedure in gaining touch with the agricultural bodies in the various parts of the Empire.

It appears to the committee that if your Lordship were to see your way clear to introduce the subject to the Governors of the various Dominions, States and Colonies, their Excellencies might be prepared to recommend through their Governments the proper bodies to be approached.

While, with regard to Great Britain, Canada, the Australian Colonies, and New Zealand, no difficulty is anticipated in getting into touch with representative agricultural bodies, there are other countries with which we wish to gain touch, but wherein various circumstances tend to make this difficult. Ireland, as far as I am aware, has no widely representative non-official agricultural body, but Ireland should be represented in the Imperial Union. Different circumstances again have to be considered in dealing with the West Indian Islands and British Guiana. There is also the case of India, which appears to us to require special consideration. Upon such points your Lordship's views would be greatly valued.

I am directed by the President to say that the project had the warm support of all delegates at the Inter-Colonial Conference, but the general feeling appeared to be that the organisation should, as far as possible, be non-official, and therefore affiliation with the already formed International Agricultural Association was regarded, on that account, as undesirable and also impracticable on account of the financial aspect.—I have, etc.,

DUNCAN M. EADIE, Secretary.

The following is the reply to this letter:—

Governor's Office, Johannesburg, 21st December, 1909.

Sir,—I have the honour to acknowledge the receipt of your letter of the 15th December, enclosing a copy of Mr. Robertson's circular letter, to which you refer in your letter to Lord Selborne of the 6th December.

Lord Selborne has now carefully considered this matter, and notes that, while the members of your Union do not desire to be affiliated with the international Agricultural Institute, the headquarters of which are in Rome, they are anxious to arrange for the formation of a Union representative of British Colonial agricultural interests throughout the Empire, and to invite delegates from other agricultural bodies throughout the Empire to a Congress to be held in Capetown at the time of the opening of the Union Parliament. As His Excellency understands that you are not in a position to communicate direct with all such bodies, he thinks that your best plan will be to address to him officially, through the Minister of Agriculture, a communication showing in detail the nature of the arrangements which your Union proposes, and conveying to the other

agricultural bodies throughout the Empire the invitation of your Union to the suggested Conference. If the Minister of Agriculture endorses the proposals of your Union, His Excellency will be glad to forward them to the Secretary of State for the Colonies with the request that he will distribute copies of them through the Governors-General of Canada and Australia, the Governors of the other British Colonies and the Viceroy of India, to the various agricultural bodies throughout the Empire, so that these bodies may be in a position to send comments upon your proposals direct to your Union, and to reply to your invitation to the suggested Conference.—I have, etc.,

D. MALCOLM, Private Secretary.

It was decided to send a delegation to interview the Government on the subject.

EAST COAST FEVER.

In view of the fact that the subject would come up later on under the new resolutions, it was decided to postpone consideration of this part of the Executive's report until the resolutions referred to came under discussion.

ORGANISATION OF UNION.

The President suggested that a committee be appointed to go into the matter of this section of the Executive's report and consolidate the proposals contained therein. This was accordingly formally moved and carried.

GOVERNMENT REPLIES TO LAST YEAR'S RESOLUTIONS.

The next "order of the day" was the consideration of the replies furnished by Government to resolutions passed at the Durban Conference of the Union last year. From considerations of space we do not propose to refer to the replies considered by the Conference as satisfactory, and will therefore only allude to such as elicited discussion. The first of these was the reply to the resolution passed last year on the subject of

AGRICULTURAL EDUCATION.

Last year's resolution read as follows:—

"(a) With a view to securing this object, Conference strongly recommends to the various South African Governments the introduction of "Nature Study" into all schools.

"(b) Further, this Conference strongly urges the introduction into certain schools of a course of technical agricultural training, both practical as well as theoretical.

"(c) (1) Such a course to be an optional one; (2) Such a course to be uniform in its principles in all schools adopting the course within South Africa; (3) The different educational departments within South Africa to decide upon the standard in which such a course shall first be introduced.

"(d) This Conference is of opinion that institutes should be opened in South Africa for training such teachers to impart such Nature Study, together with technical agricultural knowledge."

The following replies were received:—

Cape Colony: The matter of the Nature Study in-schools is receiving attention. A vacation course in Nature Study for teachers is being held in Capetown during the forthcoming summer vacations.

Transvaal: I regret to say that for financial reasons the Colonial Secretary has been compelled to withdraw his sanction for the establishment of a branch of the department specially charged with rural education. The work is going on, however, and at the Normal Colleges courses are being carried out so as to fit teachers for this very important work. I do not think technical agricultural training beyond what is comprehended in the Nature Study course is practicable in the primary schools of the Colony. It may be possible to develop such work in time with the older pupils in secondary schools.

Union: This matter concerns the Minister of Education, and has been referred to his Department for reply.

It was agreed to send back this resolution to Government.

RAILWAY MATTERS.

The following resolutions were re-affirmed and the Secretary instructed to return them to Government for further consideration:—

"(a) That it is necessary that fast live-stock trains be run wherever the traffic justifies it on certain days in each week.

"(b) That the various railway systems of South Africa be approached with a view to securing the same privileges for the staff of monthly agricultural papers, such as the *Farmers' Advocate*, *The S.A. Agriculturist and Stock Breeder*, *The S.A. Farmers' Journal*, etc., as are granted to the staffs of daily and weekly papers when travelling in the interests of such papers.

"(c) That returned empties of a recognised sort for sending fowls, butter, eggs, wine, etc., be carried by the railway at the lowest possible paying rate.

"(d) That the railway rates on artificial manure be reduced to a minimum."

The Union Government's reply was to the effect that the matter had been referred to the Secretary for Railways and Harbours.

LAWS.

The following resolutions passed last year, and the Government replies to them, were read:—

“(a) That in the interest of South African manufacturers, who, in many cases, employ local agricultural products, it is necessary that a law be framed to prevent the “dumping” of goods manufactured oversea within South African territories at prices below those charged in the ordinary course of wholesale trade in countries where such goods are manufactured.

“(b) Seeing that the farmers of South Africa are largely dependent upon the agency of parcels’ post for obtaining seeds, the rate for such packages containing imported seeds be placed on the same level as that for South African agricultural produce, and the rates be inter-Colonial.

“(c) That this Conference continues to urge upon all South African Governments the necessity for the framing of a law which will assist in the securing of artificial fertilisers of standard quality, and of seeds true to name, free from impurities, and of good germinating power; and that provision be made in such law for proper inspection of these goods.

REPLIES.—*Cape Colony*: (a) The question is now one for the Union Parliament to deal with, and no doubt the matter will have prompt consideration. (b) In Cape Colony the parcel post rate for South African agricultural produce is the same as for other articles, including imported seeds, and the resolution as above cannot therefore be usefully discussed at the present time. (c) The Government of this Colony is in sympathy with the terms of the resolution, and has already adopted legislation in the direction desired, which is contained in Act No. 20 of 1907, of which I enclose a copy, as well as a copy of the regulations issued thereunder by Proclamation No. 453 of 1909.

Union: This matter has been referred to the Secretary for Commerce and Industry. (c) The Government will do its best to give effect to the suggestion contained in this resolution, but legislation will be required in order to do so.

It was resolved to return these resolutions to Government for further consideration.

EPIZOOTIC LYMPHANGITIS.

The following resolution passed last year, and Governmentt replies thereto, were read:—

“That the Government take immediate steps for the eradication of and prevention of the spread of the disease which has broken out amongst mules, and which is known as Epizootic Lymphangitis.”

REPLIES.—*Cape Colony*: Machinery already exists for dealing with the disease in question under the Animal Diseases Act, and this Government has succeeded in practically stamping it out. There have been only

four outbreaks in this Colony during the current year, all in the Humansdorp Division, and special attention is being devoted to this area with a view to completely eradicating the disease.

Transvaal: Due care is being taken to prevent the introduction of equines affected with this disease from Natal, all equines entering from that Colony being systematically examined from time to time, and so far as the Transvaal is concerned there is no reason to believe that the disease is either prevalent or that it is spreading, as only eight outbreaks of Epizootic Lymphangitis were dealt with by our officers during the year ending June 30, 1909.

Union: Every effort has been made to control Epizootic Lymphangitis, and as a matter of fact the disease has been nearly extirpated. A Consolidated Diseases Animals Act is under consideration, and it is hoped will be introduced into the Union Parliament at its first sitting.

It was decided to ask the Union Government to submit the proposed legislation to the Agricultural Union for consideration before it is presented to Parliament.

It was here decided to take the remainder of the last year's resolutions and replies as read, with the right for any delegate to revert to them as occasion might require. The consideration of the new resolutions on the agenda paper was then proceeded with.

New Resolutions.

ERADICATION OF SCAB.

Mr. Struben (Cape) moved:—

"That the Union Government be urged to undertake the eradication of sheep and goat scab on the 'Block' system' at the earliest possible moment."

He said scab had retarded the progress of the sheep industry; and the best way to eradicate it, in his opinion, was by means of the block system. He proposed to take the block system first, and apply the Act in the most stringent manner. No sheep would be allowed outside the block until the latter was clear of scab. One of the chief dangers was that farmers had to trek, and this infected the clean flocks through which they passed. Once they were clean, they need never be troubled with the disease again.

Mr. Rubidge (Cape) thought they should commence at the coast and work into the interior. Farmers had found in the past that the various pests which the country had suffered from had come up from the sea ports. He quite believed that if Mr. Davidson were given a free hand he would soon rid the country of scab. But so long as the Act was administered

as it had been administered, and fines of 2s. 6d instead of pounds were imposed, they would never get rid of the disease.

Mr. Jas. King (Natal) considered that the system inaugurated in Natal some thirty-five years ago should be put into force, namely, that on a certain date dipping should take place, and all who did not dip compelled to take out a license, which cost £3 and was available only for three months. That system had had most excellent results in Natal—so much so that just before the Boer War it would have been possible to count the number of licensed flocks on the fingers of one hand. If they adopted the block system it would take them probably ten years or more to eradicate scab. But whatever law was put in force, it should be enforced uniformly throughout, not piecemeal.

Mr. Davidson (Chief Veterinary Surgeon, Cape) contended that the only effective means of eradicating scab was by the block system. He pointed out that dipping, to be effective, must be done under the supervision of Government inspectors, and the great area of the country precluded the possibility of any such supervision at one time. It was for this reason that the adoption of the block system was urged—so that supervision might be concentrated on relatively small areas. Proceeding, he said that they must entirely prohibit the movement of infected sheep; and there must be no loophole for the introduction of sheep from without. All the old kraals must be destroyed, as they retained the power of communicating the disease for a period of three years. Another point he emphasised was that all staff appointments must be made by Government, from men outside the district in which they were to serve. In reply to a question, Mr. Davidson said that the fines imposed by the Magistrates in the Cape Province were totally inadequate—in fact, the Act was administered too sympathetically. He also said that, under the block system, scab could be eradicated in three years.

Mr. Joubert (Free State) thought that the system to be adopted by each Province should be left to the Government, as the needs of the different Provinces would vary.

Mr. Barry (Free State) supported simultaneous dipping. He considered the block system would take too long, and those whom the blocks had not yet reached would have to suffer too long.

It was pointed out that the Free State could be treated as one block.

Mr. Davidson said that under the block system simultaneous dipping could be adopted—in the Cape Province it was enforced in April and May.

Mr. Nicholson (Transvaal) moved as an amendment:—

“That the Union Government be urged to pass a uniformly strong and compulsory Act for the eradication of scab in sheep and goats at as early a date as possible, and that such Act shall make provision for the adoption of the ‘Block system’ and for ‘simultaneously dipping’ under

effective supervision, as it is found that the one or other system will prove most effective, and that all officials in control of the working of this law shall be directly appointed by the Minister of Agriculture."

In reply to a question by Mr. Jack, Mr. Davidson said that his plan would be to divide the Cape Province into four blocks, so as to interfere with the transportation of stock as little as possible. From No. 1 block the staff would be removed to No. 2 block, leaving a certain number to supervise the work done. As each block was undertaken the work would grow less.

Mr. Struben, replying, said there should be no difficulty in adopting the block system. Fines would not stop the spread of the disease, and would not be nearly as effective as if the movement of sheep were controlled. Clean sheep could be allowed out of the block, but sheep from outside would not be allowed to enter that area. He considered that those charged with the administration of the Scab Laws should be allowed a free hand and be removed from political influence. Simultaneous dipping could not be carried out all over the country—it would require an army corps of supervisors—but the principle could be applied to blocks of country, treating each block separately.

On being put to the vote, the original motion was lost and Mr. Nicholson's amendment carried.

IMPROVEMENT OF MERINO FLOCKS.

Mr. Jack (Cape) moved:—

"That the Union Government be urged to consider the question of the more rapid improvement of the mass of merino sheep flocks throughout the Union; and that Congress would suggest the supply by the Department of Agriculture of good flock rams, either imported or locally purchased, by sales at convenient centres at 'upset' prices."

He said that the difficulty was that farmers were unable to get at the centres where the best rams were obtainable. It was not a question of pauperising; the farmers were quite able and willing to pay for the animals.

Mr. Struben (Cape) supported the motion, but suggested that the words "either imported or locally purchased" be eliminated.

Another delegate said that thirty or forty years ago farmers travelled hundreds of miles in their wagons to buy sheep, and if they could do it then, surely they could do it now, with the present railway facilities.

It was pointed out by another gentleman that different climates and soils required different types of sheep, and that consequently a type that was suited to one section of the country might not be suited to another.

Mr. Joubert (Free State) thought the Government might assist farmers by advising them what types of rams to buy, according to locality.

Mr. Hunt (Transvaal) supported this view.

Mr. Jack, in replying, agreed that they must build up certain types for certain districts, but there were some districts in which the standard of the sheep was very low, and the use of sires from other districts and from oversea would be valuable as a start in the improvement of their flocks.

The motion was lost.

JUDGES FROM OVERSEA.

Mr. Struben (Cape) moved:—

“That the Union Government be requested to obtain the paid services of judges from oversea for at least two successive years, who shall judge, as single judges, at as many shows as possible throughout the Union during the show season; one each for (a) light horses, (b) heavy horses, (c) beef cattle, (d) dairy cattle, (e) merino sheep; and that such judges shall undertake to deliver lectures and give demonstrations at the chief shows.”

He thought this would do a great deal in the direction of evening up the classification of exhibits.

On the suggestion of Mr. Hunt (Transvaal) Mr. Struben withdrew the resolution on condition that it be submitted to all agricultural judges' associations in the Union.

FREE RAILWAY TICKETS TO JUDGES.

Mr. Johnstone (Free State) moved:—

“That the South African Railways be asked to give free tickets to judges officiating at agricultural shows.”

He said that the object of the resolution was to enable the smaller shows to get the best judges

On the motion of Mr. Nicholson (Transvaal), the following amendment was substituted for the original resolution:—

“That the various Railway Administrations in the sphere of influence of this Union be asked to give 12 free return tickets to judges at the central shows, and six such tickets to judges for local shows, while the present concessions operate for the balance of the judges required.”

The resolution, as thus amended, was carried.

REFUND ON AGRICULTURAL SHOW TRAFFIC.

Mr. Johnstone (Free State) moved:—

“This Conference recommends that the S.A.R. be approached with a view to facilitating the refund on agricultural show traffic.”

The resolution was carried unanimously.

DELAY IN FORWARDING SHOW STOCK.

Mr. Johnstone (Free State) moved:—

“That the attention of the Administration of the S.A.R. be drawn to the delay which often occurs in forwarding show stock and exhibits, and that it be a recommendation to the Railway Administration that more free attendants’ tickets should be allowed for servants accompanying show stock.”

The resolution was carried unanimously.

LIVE STOCK ON RAILWAYS.

A Cape delegate moved:—

“That this Congress urges upon the Union Government the necessity for an increased number of live stock trucks on the railways, and more rapid transit.”

Mr. King (Natal) seconded. He said that the time would soon come when inspection would be necessary. He referred also to the question of the charging of demurrage: it was a one-sided matter, as the sender of stock often had to wait three or four days before he could get trucks, and he could get no redress. There was also the matter of leaving stock without food and water for days on end, for which supervision was necessary.

Another speaker said that a Commission was appointed by the Government to inquire into the matter of the treatment of stock on the railways, and had made a number of recommendations, which, however, had so far not been put into effect. He recommended the addition of the following words:—“That this Agricultural Union urges the Union Government to carry into effect all the recommendations of the Commission appointed by the Transvaal Government to inquire into the treatment of live stock on railways.” This was agreed to by the mover.

Mr. Jack moved a further addition: “and that this Union appoint a committee to watch the interests of farmers until such time as these recommendations are put into effect.”

It was agreed to postpone further discussion on the subject to enable a copy of the report of the Commission referred to to be obtained for the information of the Conference.

RAILWAY CONCESSIONS TO DELEGATES.

Mr. H. Bazley (Natal) moved:—

“That, in the opinion of this Union, the South African Railways should issue to delegates duly appointed to the annual Conference of the

Inter-Colonial Union free railway passes, entitling them to travel to and from the Conference, wherever held."

Mr. King (Natal) seconded.

Mr. Nicholson (Transvaal) thought a monetary grant would be better.

The resolution was carried.

REFUND ON SHOW TRAFFIC.

At the instance of the Free State delegates it was resolved:—

"That this Conference recommends that the S.A.R. be approached with a view to facilitating the refund on agricultural show traffic."

WORKING OF SHOWS.

Mr. Johnstone moved:—

"(a) As it is desirable that the larger agricultural societies adopt uniform show regulations and frame a model prize list, the Secretary of the Union be instructed to communicate with the secretaries of the Port Elizabeth, Rosebank, Bloemfontein, Pretoria, Johannesburg, Durban, Maritzburg and Bulawayo Agricultural Societies, suggesting that the representative of each of the above Societies arrange for a conference to carry this into effect.

"(b) That with a view to the efficient working of agricultural shows throughout South Africa, it is desirable that uniform methods be adopted, wherever practicable, in relation to the management, etc., of such shows, and that show dates shall be fixed by the Annual Conference of this Union."

The resolution was carried unanimously.

FARMERS' TRIP TO EUROPE.

The following resolution was moved by the Transvaal Union:—

"That this Conference desires to urge upon the Union Government the advisability of carrying out the scheme suggested by Dr. Macdonald, of the Transvaal, in respect of a farmers' trip to Europe and America."

Mr. Jack spoke against the scheme, considering the request an unreasonable one.

It was resolved that the motion be left over until Dr. Macdonald could be present to explain the scheme.

OSTRICH EXPERT.

Mr. Brown (Cape) moved:—

"That this Congress favours extending to British East Africa facili-

ties in the matter of importing ostriches from the Cape; but urges the Government to take steps to prohibit the exportation of ostriches anywhere by sea."

He said that there were wild ostriches in B.E.A., and that, if they were to protect the industry, they should go hand in hand with ostrich farmers there, in order to get them to confine their borders as was done in South Africa. If this was not done, the industry in South Africa would eventually be destroyed.

The President pointed out that it would be a necessary condition that B.E.A. should have similar export legislation to that prevailing in South Africa.

The motion was carried.

INTRODUCTION OF SIRES.

Mr. Van Reenen (Free State) moved:—

"Congress is of opinion the time has now arrived that the importation of bulls, rams and stallions should be under the surveillance of a qualified official, with the object of preventing the introduction of undesirable sires."

Mr. Joubert (Free State) seconded.

Mr. King asked whether it was the idea to prohibit the introduction of sires? If not, what was the use of it? It would be impossible to prevent the landing of "undesirable" sires. It was an impossible resolution altogether.

In explaining the resolution Mr. Van Reenen said it had been framed rather with a view to giving advice to importers.

Mr. Starke asked where the supervision was to be—at the point of shipment or in this country?

Mr. Jack moved an amendment advocating the submittal of the question to the district associations, and reporting upon same at the next Conference.

In reply to a question, Mr. Power (C.V.S., Natal), said that there was supervision for contagious diseases but not for hereditary diseases.

Voting by Provinces, there was the same number of votes for and against Mr. Jack's amendment, and the Chairman gave his casting vote in favour of it.

UNION DEPARTMENT OF AGRICULTURE.

Mr. Jack (Cape) moved:—

"That this Congress represent to the Government the absolute imperative need of having one Department of Agriculture for the Union, run on the lines of the Department of Agriculture of the United States of America."

He said he wanted to see the technical men of the Department of Agriculture free to do whatever they could for the advancement of agriculture, and to secure this they should adopt the American Bureau system.

Mr. Nicholson asked whether Mr. Jack meant that there should be one Department only, or a controlling one with Provincial Departments as well. In the latter case he was fully in accord with the resolution.

Mr. Mitchell (Natal) said the resolution was too vague; there should be some detailed expression as to what was wanted, to be forwarded to Government.

The resolution was carried.

It was decided to leave the matter in the hands of the Executive to represent the matter to the Government.

SIRES AT STUD.

Mr. Kolbe (Free State) moved:—

“That this Conference is of opinion—

“(1) That all stallions standing at public stud should undergo an inspection by competent persons nominated by Government, and that licenses should be issued for those considered suitable for breeding purposes.

“(2) That all private stallions be inspected, and the owners thereof advised of their suitability as sires.

“(3) That farmers financially unable to buy useful sires be assisted by Government in any way considered most favourable, so that suitable sires might be placed at their disposal.”

Mr. Joubert (Free State) seconded.

Mr. King (Natal) thought that the idea embodied in Section 1 was an impossible one. He thought that the three sections should have been separated into at least two resolutions.

The mover was willing that the three sections should be treated as separate resolutions; and this was agreed to by the Conference.

Section 1, on being put to the vote, was carried.

On Section 2, Mr. Nicholson (Transvaal) said he could not support this resolution, as what might be considered unsuitable by an inspector might be suitable for the farmer's particular class of mares.

Mr. King (Natal) said there were constitutional defects which might not be obvious to the owner but which would be apparent to an expert.

It was pointed out by other speakers that the resolution was intended merely to enable farmers to obtain advice, and so gradually educate them up to a high standard.

Mr. Kolbe, in reply, said it was the principle which he wanted to see passed, not necessarily the actual wording of the resolution as it stood.

This section of the resolution was passed unanimously.

On Section 3,

Mr. O. E. Evans (Cape) thought the resolution was a little vaguely worded.

Mr. Kolbe agreed to the substitution of the words "either by loan or hire as may be considered most practicable" for the words "in any way considered most favourable."

The resolution was adopted unanimously.

DISTRIBUTION OF STUD HORSES.

Rev. Jas. Scott (Natal) moved:—

"That the Conference is of opinion that the Union Government should establish a system whereby stud horses can be made available for breeding purposes at various centres throughout South Africa."

He said the system would not ultimately cost the Government anything, though it would mean some expense, no doubt, at first. He said Mr. Pitchford was in favour of this system. He (Mr. Scott) suggested a fee of £2 each for serving. He thought there were many parts of South Africa, outside Natal, where the system would be invaluable. It was the poor man who wanted such assistance, not the big farmer, who could afford to buy his own stallions. Stallions up to £100 each would be quite suitable.

Mr. Poulteney asked why bulls should not be included also. He asked that the resolution be altered accordingly.

Mr. King (Natal) said some attention should be given to the question of suitable dams. He said as good a class of animals was not being turned out now as compared with 30 or 40 years ago. This he ascribed to the inferiority of the mares used. This had come about by reason of the purchase of inferior mares, cheap, from the Natives. This was an important point. Advice should be given to farmers in the matter of suitable mares for breeding purposes. He supported the resolution, and pointed out that the scheme would not cost the country anything eventually.

Mr. Nicholson (Transvaal) said that something of the same system as that referred to was already in force in the Transvaal. In the Free State, too, he believed that mares were being imported by the Government for Government stud purposes.

Mr. Joubert (Free State) said that although they realised that they must have good mares, still they felt that the stallion was the more important. The question of bulls had been considered by the municipalities in the Free State, and they had decided to obtain good sires and place them at public stud. (Hear, hear.)

In reply to Mr. Poulteney, Mr. Scott said that he thought that it would be better to stick to one class of stock at a time.

The resolution was carried unanimously.

(To be continued.)

The Faults of Butter-making.

THE FAULTS OF BUTTER-MAKING.

By E. O. CHALLIS,

Dairy Expert, Cape Province.

(A Paper read before the Paarl Farmers' Association, September, 1910.)

THE subject I have selected to read a short paper before you to-day I have entitled "The Faults of Butter-Making." That faults do exist is fully exemplified when you see butter quoted on the various markets at prices ranging from 7d. to 1s. 6d. per lb. Further than this, if one butter-maker gets 1s. 6d. and another 7d. per lb., both residing in the same district, it is quite evident that at some stage or other in the process of manufacture the butter-maker is at fault, and not the prevailing conditions. The problem of making good butter under the climatic conditions which prevail in South Africa is not so easy as many people imagine, especially when high temperatures have to be contended with, without the assistance of either ice or mechanical refrigeration. But, apart from the difficulty of controlling temperatures during the hot summer months, a good average butter of uniform quality can be produced all the year round if the principles underlying the making of good butter are strictly carried out. That these principles do not always prevail is very apparent from the variations in the market quotations already alluded to. This brings me now to practically the root of all evil in regard to dairy work—*viz.*, lack of cleanliness. I know many people who at heart wish to be clean, but yet know very little beyond the elementary principles underlying real cleanliness such as the trained dairyman is taught before he learns anything else. A dairy where cream is kept previous to its conversion into butter should be scrupulously clean, well ventilated, dry, and the walls frequently lime-washed during the year. Neither should the dairy be used as a place for storing fruit, vegetables, meat etc. which so often is the case. A liberal supply of hot water should always be handy to the dairy and all dairy utensils which come in contact with butter, cream, or milk should be first washed in tepid water, then scalded in boiling water, and then be left to dry and air by themselves. Tin utensils can occasionally be washed with hot water containing common washing soda, care being exercised to well wash the soda water off any utensils it is found necessary to use it on. A scrubbing brush is always preferable to a cloth for cleaning dairy utensils, and scap should never

be used. Wooden utensils should occasionally be washed in lime water, the advantage of which I will refer to later on when dealing with black spots in butter. To give you an example of what it means to keep milk in sterile and unsterile cans, and this equally applies to cream, I will quote the following experiments. Ten gallons of mixed milk were divided into five-gallon lots. Lot 1 was placed in a can rendered sterile by means of steam, and Lot 2 placed in a can selected at random from a dairy where the washing operations were carried out in a very ordinary way. The milk placed in a sterile can and kept at a temperature ranging from 68 to 75 deg. F. kept sweet for 46 hours, and that placed in the unsterile can went sour in 18 hours. This, I think, conclusively proves the necessity of cleanliness in dairy work, and the example given shows that keeping qualities of the same milk can be enhanced 28 hours longer by being kept in a can properly cleansed. We now come to the next important point in butter-making, *viz.*—

THE PROPER RIPENING OF CREAM.

In order to understand how to control the ripening of cream it is as well to understand briefly what causes cream to sour. The souring of cream is exactly the same as the souring of milk—*viz.*, through the agency of living organisms, or, as they are more generally termed, bacteria. The particular bacteria which the butter-maker requires for properly ripening his cream are technically termed lactic-ferments, and these ferments have the power of converting the sugar of milk into lactic acid, and when sufficient acid has been formed the milk coagulates or thickens by souring. Milk, when drawn from the udder of a healthy cow, is practically sterile, but immediately it comes in contact with the air it becomes impregnated with bacteria to a greater or less extent, according to the amount of care exercised in the milking operations and the purity of the air surrounding the cows when being milked. The lactic ferments introduced into milk and cream when exposed to the atmosphere are controlled by heat and cold, and a temperature of 160 degrees Fahr. usually destroys them, and reducing either milk or cream to a low temperature, although not destroying the ferments, renders them inert. The temperatures at which they multiply most rapidly range from 86 degrees F. to 98 degrees F. Having these few simple facts to go upon, it is quite evident that temperature plays a very important part in the ripening of cream, and a successful butter-maker will utilise this knowledge to its utmost, and vary the temperatures of his cream in accordance with the manner in which the ripening process is proceeding. The exact time cream takes to develop sufficient acidity for churning is somewhat difficult to gauge, as so much depends on the degree of cleanliness exercised and the temperature at which the cream is ripened. As a guide, it may be taken that separated cream kept at

a temperature of 60 degrees Fahr. for 36 hours will be quite ripe enough to churn at the end of that time. This being a fair basis to go on, it may be safely assumed that nearly the whole of the cream utilised for butter-making purposes during the summer months is in an over-ripe condition. Such being the case, everything possible should be done to retard the ripening, and this is best accomplished by reducing the temperature of the cream as much as possible, using plenty of salt (in the summer months only), and paying strict attention to cleanliness. Butter made from badly-handled cream which is considerably over-ripe produces a soft, spongy, textured butter, with bad keeping qualities, and which quickly turns rancid, as the butyric ferments, which are responsible for the production of rancid butter, have already got the upper hand of the lactic ferments, the latter being so necessary for the production of a clean, well-flavoured butter.

TREATMENT OF SEPARATED CREAM.

After each separation and the resulting cream has been cooled a good handful of clean dairy salt may be added and well stirred in. Each fresh lot of cream can be treated in the same way, and when cooled and salted can be mixed with the previous day's cream, always being careful never to mix warm cream with that already cooled, and to well stir the cream when adding a fresh lot to the bulk. The importance of frequently stirring cream cannot be over-estimated, as it ensures uniform ripening and encourages the work of the lactic ferments, which belong to the class of aerobic ferments—that is, they require air for their proper development. To prevent a heavy loss in churning, no fresh cream should be added to the bulk for at least twelve to fifteen hours previous to churning.

THICK *versus* THIN CREAM.

If it were possible for every butter-maker to keep the ripening of cream under thorough control, then I should unhesitatingly advise a thin cream for butter-making purposes, say, cream containing from 30 to 35 per cent. of butter fat. Unfortunately, the high temperature which prevails here during the summer months makes it almost impossible to deal with a thin cream, so it is necessary to so adjust your separators to ensure producing a cream containing at least from 40 to 45 per cent. of butter fat. To give you some idea when your cream is of the right consistency, the best guide in a rough way is to watch the cream as it falls from the cream spout, and if same falls straight from the separator to the cream bucket the consistency will be about right. If, on the other hand, the cream shoots out from the cream-spout, and has a certain amount of curl about it, this is a sure sign that you are separating the cream too thin, and the separator should be adjusted accordingly.

BAD-FLAVOURED CREAM.

A bad-flavoured cream is nearly always the outcome of carelessness and uncleanly methods. Of course, there are exceptions—when cattle are fed injudiciously, or pick up some herb on the veld that taints the milk. But these are food taints which are very pronounced, and can be detected in both milk and cream. In dairies where cleanliness is strictly observed one seldom finds very much wrong with the cream; it may certainly be over-ripe, but it usually retains that clean, sharp, acid flavour which is so characteristic of well-managed cream. But we also come across a large percentage of cream, especially sent to the creameries, which contains every flavour imaginable except the right one, and it can be detected instantly that no attention has been paid to the details already referred to. There is only one remedy to apply to a dairy that is constantly producing a badly-tainted cream, and that is to have a thorough spring-cleaning. Everything must be taken out of the dairy where the cream is kept, and the whole building must be thoroughly cleansed and whitewashed. All utensils which come into contact with either milk or cream must be well boiled, and then a fresh start can be made. In addition to this, it would be advantageous to procure some buttermilk from a dairy where a clean-flavoured butter is being produced, and a small quantity can be added to the fresh cream, which usually results in restoring the correct flavour to cream so treated. When these somewhat drastic measures are adopted and properly carried out, I have seldom known them fail, and usually all trouble from tainted cream disappears, and does not again make its appearance until carelessness takes the place of careful management. I have dwelt at some length on the proper ripening of cream, as it is one of the key-notes to successful buttermaking, and the value of having a sound, clean-flavoured cream cannot be over-estimated. Many people think that, given a cream separator and modern butter-making utensils, they are sure to produce a good butter. This is quite a fallacy, and they can no more produce a first-class butter from an unsound cream than their forefathers could with the most obsolete utensils.

MOTTLED OR STREAKY BUTTER.

This is a very common fault prevailing throughout the length and breadth of South Africa, especially with the miscellaneous classes of butter so frequently met with on the various public markets. There are two distinct kinds of streaks in butter—*viz.*, caseous streaks, always readily recognised by the streaks themselves being much whiter in colour than the butter itself; and dark streaks, caused by the uneven distribution of the salt and subsequent insufficient working. Both streaks of this nature give the butter a mottled appearance, and are very objectionable from a market point of view, such butter usually

realising a much lower price than if no streaks were present. Butters containing caseous streaks should always be looked upon with suspicion from a keeping point of view, so we will enumerate some of the causes which produce these streaks: (1) Neglect to frequently stir the cream, especially when mixing different creams together, thus causing uneven ripening. (2) Exposing cream to direct sunlight. (3) Churning at a high temperature, and subsequently using the first washing water at too low a temperature. (4) Neglect to remove the butter-milk from the butter by insufficient washing. (5) Neglect to strain the cream, especially if same is thin and over-ripe, as such cream usually contains caseous lumps or curds, which if not removed are bound to appear in the resulting butter in the form of white specks. Another reason for straining cream, apart from removing extraneous matter, is the breaking up of any lumps which may be in the cream, and if churned in this state not only cause a loss in the butter yielded, but also cause unevenness in colour. These are some of the principal causes of caseous streaks, and no doubt there are many other minor causes which I am not able to discuss at the present time.

SALT STREAKS.

These are the most common, and at the same time most easily remedied. When adding dry salt to butter this should be done by means of a hair sieve or flour dredger, as the salt when added in this way is more evenly distributed, and all lumps are avoided. The salt should not all be added at one time, but be sprinkled on the butter somewhat gradually. After sufficient salt has been added, according to market requirements, and worked into the butter, the butter should be put away for a few hours to allow the salt to dissolve, and then be re-worked. If all these instructions are carefully carried out all cause for salt streaks will be removed. In winter the salt takes longer to dissolve, but at the same time the butter, being firmer, will stand more working, which to a certain extent obviates this difficulty. To facilitate the salt dissolving in cold weather, it may be slightly warmed in an oven before being used.

BLACK SPOTS OR MOULDS IN BUTTER.

Anyone who has had any lengthy experience in butter-making cannot fail to have observed this trouble of black spots appearing in butter, and I regret to say this trouble is spreading more and more each year in a large number of dairies and creameries throughout South Africa. Time will not permit me to more than briefly touch on the fringe of this subject; neither can I discuss in detail the many theories which have been advanced as to the cause and prevention of this well-known trouble. Broadly speaking, this particular mould is nearly always found in dark, damp, and badly-ventilated dairies, as such conditions are very

favourable to its growth. Such being the case, I can only advise farmers who have this trouble in their dairies to keep same as dry and well ventilated as possible and frequently lime-wash the walls, and all wooden utensils should be frequently well scoured with hot water into which a few handfuls of lime is well stirred in, care being taken to remove the lime-wash before it sets dry. Butter stored in cheap boxes, such as common deal, will nearly always produce black spots on butter, especially if such boxes become in any way damp. Inferior butter-paper also is often responsible for this trouble, as well as some waters used for washing butter, which on examination is found to be quite unsuitable for such purposes. When it is found necessary to put butter-paper on butter wet, on account of its softness, it is advisable, in place of putting the papers in ordinary water, to use the following solution: Take one pound of boric acid, and dissolve same in a gallon of hot water; when cool put the clear solution into clean bottles, and keep same corked up when not required for use. Butter-papers dipped into a solution of this sort helps to keep the butter in hot weather, and has a tendency to prevent black spots appearing on the surface of the butter. This only applies to butter intended to be sold fresh; for storage purposes the papers should be put on dry. These, then, are some of the faults which we meet with in butter-making, and although in a paper of this nature it is impossible to deal with such a subject as exhaustively as I would like, but still, if I have in a small way thrown some light on the difficulties which no doubt many of the butter-makers of this district have experienced, I shall feel that my presence here to-day has not been in vain.

KEEP CHICKENS OFF LONG GRASS.—Young broods of chickens should not be allowed to run out in the long grass, as by doing so they are exposed to the risk of having inflammation of the lungs through their plumage becoming wet through. There is also danger of their consuming the small insects which are found on the blades of the grass in the early part of the day, and these, in many cases, have proved to be the fore-runners of gapes, as the small insects deposit eggs in the birds, and these frequently develop into gape-worms. The possibility of this development has been tested by us for several years and we have found that chickens which have been reared under precisely the same conditions as regards food, but which have been on gravel paths or on short grass which has been regularly gone over with the lawn-mower, have not suffered from gapes at all, whereas those fed in the same way, but which have been on long grass, have been badly affected and many losses have resulted — (*Field, Farm and Fireside.*)

Poultry Keeping.

By S. WAYNE.

(A Paper read at a meeting of the Durban and Coast Poultry Club.)

(Continued from Page 623.)

I HAVE sent a good number of eggs to Salisbury Island to a friend residing there, who assures me the weakest chicks mature into robust birds. I hope so. No such thing as enteritis is known there. Why do Leghorns always fetch the highest price on our auction sales? Undoubtedly the main reason is their world-renowned laying capabilities. But one would think that an average price of 8s. 6d. a bird, which, I think, is a low estimate of what fairly well-bred Leghorns do fetch on the sales, would bring more competitors into the market, as at that price, if you have the stock, you must make money. I have no doubt that a good many tried it, but cannot produce the stock in any quantity to bring the price down. I may be mistaken in taking it for granted that other fanciers also have the same difficulty in the bringing to maturity of the White Leghorns. I do think at times that probably my ground has been run on too long, and wants a rest. I should like other fanciers to publish their experiences if they find the same difficulty.

With regard to the incubation of eggs, I find that a good Hearson's machine will hatch a better percentage of chicks than the same number of eggs put under hens. You are lucky if your average breakage under each hen is not more than two, and usually a chick gets crushed before the hen leaves the nest. I find the best way is to put some hens down at the same time as you set the incubator, and pass the incubator chicks on to the hens as they come out. I have never been successful with artificially-heated brooders. I look upon the majority of brooders as death-traps, as far as their use on the coast is concerned.

HOUSING OF POULTRY.

Thirteen years ago the principal method adopted in housing poultry was either the long shed, partitioned off, and the runs running longitudinally off, or the octagon house with runs converging into it. I adopted the long shed plan with spring doors dividing the houses. This form of house certainly recommends itself as economising to material and labour, but disease has a nasty way of running right through the flock on this principle, and I think the more modern method which I

have now adopted of having single houses right away from one another (to roost ten birds), and a grass run to each of 125 ft. by 25 ft., is better. I very rarely get such a disease as roup playing havoc since I have adopted this plan.

Chicken Houses.—These I have on four plough wheels, and the size of runs 8 ft. 6 in. long by 2 ft. high. Being on wheels, they can be run on to fresh ground daily. I keep the chick up with the mother for the first week, then allow them out, always in fine weather. The sleeping compartment has a tray fixed in, which is covered with peat moss, and does away with the necessity for cleaning the droppings away for some considerable period.

FEEDING ADULT FOWLS.

For many years I have adopted soft feed in the morning and corn at night time, the soft feed made up as follows:—One-third each Spratt's Laymore, bran, polards, and, when I can get it, bloodmeal, which is a most valuable egg coiner, and three times weekly a few handfuls of boiled rice, wheat, amabela, or short oats for evening feed. I cut up all the green food and put in a box. This is less wasteful than the tying up of cabbage or lettuce: such a quantity is pecked off and trodden under-foot when this plan is adopted. The corn I throw in a deep hole which I have in the run. This is covered about a foot deep in leaves, and keeps the birds well exercised in scratching for their food.

FEEDING CHICKENS.

I have never given chicks hard boiled eggs; it is quite too expensive a feed, without, I should say, corresponding results. Coarse oatmeal is the foundation feed for the first few days, then I mix Spratt's chieko with the oatmeal and feed on this for about ten weeks with occasional variations, such as boiled rice and chopped meat. I have also tried with very considerable success, the Devonshire cake receipe as given in the *S.A.P. Journal*, about 18 months ago. I certainly think the salts introduced into this cake are very beneficial indeed.

DISEASES OF POULTRY.

I have come to the conclusion after long and varied experience in supposed remedies for all the ills that poultry are heir to, that the less one spends on medicine the less mortality you will have in your flock, and your balance-sheet will certainly be healthier. Still, one doesn't like to see a valuable bird looking seedy without trying to improve matters, especially if one can diagnose the disease the bird is suffering from, but as often as not too much kindness kills, either by giving too large a dose of medicine or not enough. Our knowledge and treatment of poultry diseases in this country is still in its infancy. As we all know—those who have been in the fancy for any length of time—there are a number

of similar ailments which can easily be set right, such as scaly legs in the early stages, white comb, etc. These I don't intend to touch upon. But there are one or two diseases which periodically claim a good number of poultry.

The old Natal fowlsickness, as far as we fanciers are concerned, is a thing of the past, birds dying on the roost at night with black combs brought about by the excessive use of mealie feeding. We no longer confine ourselves to this feed, and this form of sickness has largely vanished, but what we are troubled with, and I may say right down the coast line to Capetown, is known as "enteritis." During a recent visit of Mr. Hocking (the White Leghorn fancier in those parts) to Natal, he called on me, and we had quite a good talk over poultry matters, and he touched on this disease and told me it was quite as bad as the Cape as here. Sometimes a bird will get it by merely moving it from one yard to another, both yards being free from disease, and this is my experience. Birds coming from England will get it, that have been put on fresh ground where birds have not been running for six months, but I have noticed that it attacks most severely after a change in the weather—a three days' rain will develop cases rapidly. The symptoms are as follow: It will be noticed in the first stages that the bird stands moping about, then the droppings take the form of a yellowish, greenish, whitish watery discharge, and the bird goes down on its hocks and generally dies the third day. With some cases, even if taken in the very early stages, no treatment seems to be of any use. In other cases they recover rapidly, but it takes, as a rule, ten days before they are quite well again. Some seasons are worse than others. Adult birds are more easily cured than birds from ten weeks to four months.

Remedy.—For several seasons I used castor oil and sweet oil (two teaspoonfuls daily for two days), but I am afraid successes were rare. I was told coffee beans were good, but I think green peas would have been just as much use. Sweet oil and chlorodine saved some cases followed up by Parish's chemical food as a tonic. I am now using a brown powder pounded from a wild runner, which the Kafirs call "jalap," and put up by Mr. Bower, of the Bluff. Boiling water is poured on the powder, and it looks like very strong tea. It has a bitter taste. Three teaspoonfuls daily is the dose, followed up by Parish's chemical food. This, so far, along with Mr. Pearce's recipe for pills for the same disease has saved me a good many birds.

Roup.—This disease in its various form is treated on by every poultry book issued, and no doubt a good many of those present this evening have treated a good many cases; the only form in which this disease attacks my birds is in the eye, commencing with a few bubbles in the corner of the eye. If taken in hand in the early stages and the eye bathed

with a solution of chlorinated soda, which I may add is very inexpensive, and after bathing paint under the eye with tincture of iodine, a cure usually results very quickly. Give Epsom salts in drinking water, but should the bird not be noticed in the early stages it is a somewhat more tedious cure, and usually necessitates an operation; the hard swelling under the eye will have to be lanced, and the cheesy matter abstracted with a quill or something similar, the thumb of the operator being pressed up against the roof of the mouth; this forces the mucous matter out where the incision is made. When all is clear, syringe the wound out with any antiseptic. This operation may have to be performed for three or four days before the bird is right again; if this is not attended to the bird usually loses the eye altogether. Since using lime in my houses on the dropping boards I very seldom get a case. I recommend this as a preventive against roup.

Chicken Diseases.

Chicks hatched in May, June, and July, if cared for, generally escape the ills to which the later hatched chicks are prone, such as chicken-pox and drooping wings, and it is therefore advisable to hatch as many in the early months as it is possible. The difficulty comes in where to get the eggs from at this early period. Birds imported from England to arrive here at the end of March will give you eggs right through the winter. The progeny in their turn should be early layers, and chicks can be hatched in the early months; otherwise it is somewhat difficult to get eggs for sitting in these months. August and September chicks, if not held back by sickness, come on well for the next year's shows. I must put first on the list of chicken ailments during September to January months the drooping wing disease. Your chicks are apparently doing well, in the pink of health, when you will notice that all at once one or two chicks are moping and the wings falling. This usually occurs after a day's wet weather. Although your chicks may have been penned up quite dry, they get attacked. Once they have started to droop the wings, I have never found any cure; they waste away. I think a daily mixture of Parish's chemical food in the chickens' drinking water will enable the stronger ones to ward off the attack; at least, that is the result of one or two experiments I have tried. This all means expense, and to the man who has a large flock of chicks to rear it is quite out of the question to give them this tonic in the water, owing to the expense incurred. Personally, I put it down to a sort of malarial fever. The rains start here about the end of September, and so do the drooping wings in chicks. You can keep chicks up quite dry while the rains are on; let them out on a bright day, with the steam and vapour coming from the ground after the rain, and some of them will get it. Can anyone amongst the fanciers present this evening suggest some preventive or a cure? I may mention

last year I gave Devonshire salts in the chicks' food, and I had very few cases of drooping wings in my yard. Still, this may have been a pure coincidence. Those that were attacked I couldn't cure.

Chicken-Pox.

This disease, as we all know, has played havoc amongst the chickens for many years, but we don't fear it to-day as we did in the past: we have certain remedies which we have proved will cure except in the case of very young chicks, when they are best left to battle for themselves. If they survive, all well and good. I have found, up to six weeks old, that to attempt to treat cases of chicken-pox is to kill more than you cure. They cannot stand the application of the remedies which we use, namely, a solution of permanganate of potash soaked well on the affected parts twice daily for three days; or to touch the nodules with Jeyes or Kerol, taking care not to let the fluid touch the bird's eye. Providing the bird does not contract roup it is well again in a few days. I think it is just as well to add some roup powder to the soft food while undergoing the cure. Personally, I prefer the potash cure, although in damp weather the birds are more likely to get a cold when using this remedy. The only objection I have to the Jeyes is that it is very severe, and it is somewhat difficult to keep the liquid out of the eye, especially if the eye is surrounded by nodules. Cockerels and pullets during the rainy season are subject to the enteritis scourge, the treatment of which I have already referred to.

The diseases mentioned, I think, are likely to occur in the best kept yards, especially if poultry have been running on the same ground year in and out, and most of our fanciers have to put up with those conditions, our ground being limited. The best we can do is to keep the ground in as sanitary a condition as possible, and isolate cases of sickness as soon as they appear. But I say that, even with the disadvantages of small spaces at one's disposal, the fancier who looks after his birds, and feeds them rationally, need not worry too much about sickness. Cases will occur in the best yards. Birds die prematurely, the same as human beings, and where all care and skill is exercised it is often without avail.

UNFERTILE EGGS.

No doubt a good many fanciers will have had the same experience as I have in selling eggs for incubation. The purchaser will call on you 22 days after the eggs have been sold, and tell you, with a very black look, that the eggs you sold him were unfertile; only seven chicks hatched out of twelve eggs. You express your sympathy, and ask him to return the eggs, and you replace the same. On the eggs being returned and tested, quite half the cases that have been brought to my notice contain chicks or fertilisation has started, and been checked by some cause or

another. It cannot be too clearly recognised that an addled egg is a fertile egg, but at some period of incubation the egg has been chilled, or the vital germ has not been strong enough to survive, and then the process of decomposition sets in; and hence we get the exploding addled egg, which is proof positive of life having been present during the early stages of incubation. Barren eggs or unfertile eggs remain a clear yellow to the last, and only emit a musty smell. It is only within the last week that a purchaser brought me back ten eggs out of 32 (the balance having hatched) as being unfertile. I tested them, and found five with 18-day-old chicks in and two fertilised, being of the exploding type; balance, three unfertile. We fanciers very often have a deal of groundless suspicion cast upon us when eggs which we sell don't hatch, and if those would-be fanciers would only just read up what constitutes a fertile egg, a good deal of heartburning would be removed.

PLENTY TO LEARN.

In conclusion, if I may be allowed to give a few words of advice to our young fanciers—don't run away with the idea that you know everything about poultry lore because you have kept birds of some sort or another for a few seasons. There is always plenty to learn. I look upon myself as just past the novice stage after 13 years of keen poultry fancy. Don't be like that poultry farmer, not 15 miles from Durban, who, when I asked him why he did not come to our show and learn something relative to the breeds he intended keeping and what prices he could charge when he could breed something similar, replied: "You cannot teach me anything about pure bred stock and poultry points; it would be a waste of time my coming in." Considering that the party in question had never bred a prize bird, I was somewhat astonished at his reply, and mentally predicted his career as a poultry farmer and fancier of pure bred stock would not be crowned by success. And time has fulfilled my prediction. Don't be afraid of asking any of the older fanciers to solve some of the knotty points that are continually cropping up. True fanciers are only too willing to give any information they can.

During my twelve years' association with the Poultry Club, I think I can fairly claim to have been through the list of offices associated with the Club—committee-man, yard committee—and in the days of staging in the Market House these offices were no sinecure. Many a battle of words used to arise over the staging of poultry *versus* pigeons, as some of you will recollect—vice-president, president, and treasurer; so I feel that I have somewhat earned a rest from active labour in the Club, although my interest in the Durban and Coast Poultry Club is just as keen as ever. But with so many young fanciers coming on, it is time we older men made way for the younger bloods to do the battling.

A Visit to Cedara.

By A. E. DIXON, F.C.S.

HAVING been on a visit to Cedara to put in some test plots on a new system of manuring I thought it would be interesting to readers of the *Agricultural Journal* to hear the views of an outsider on the value of such and agricultural school the Government have placed before the Natal public.

Cedara stands as a sign post in the history of the evolution of this Colony. Great changes are taking place in the direction of the betterment of the nation, and when this movement strikes at the rock bed of success, the improvement of the land in the direction of industrial work and invention, it will be a movement of national progress.

Practical demonstration is the outcome of this school of agriculture. The officers of the institution are imbued with a progressive spirit. This spirit of evolution is seen in its social life, its intellectual grasp, its moral tone, its natural aspirations; it well meets the emergencies of the Natal farmer, as it leads him to intelligent instruction and manual training.

When the inner teaching meets the outward practice this co-operative power is the secret of the success of the Cedara pupil; this training he receives will give him self-government over the various branches of farming and forestry; this co-operation is better than blind obedience to book law; it brings mind to govern matter and individual originality over parrot-like imitation. It brings the farmer into his right mould, gives him tools to conquer his enemies in the soil and farm, and imbues him with an intellectual and moral superiority, giving new life to the centre of his home surroundings.

Cedara has imbibed the inspiration of the poet Lowell.

New occasions teach new duties,
Time makes ancient good uncouth.
We must upward still and onward
Who would keep abreast of truth.

Leaving the main building, the dairy and poultry work is the first that meets your attention. The clean cow-house, with its well-drained floor, water laid on and salt laid in boxes, with every convenience of comfort, a little shorthorn in the blood, a pasture of *Paspalum* grass, a silo for winter food, a clean Bradford's churn, and a willing heart to work, gives the dairy a look of freshness and purity of output. It would

be well if the wives and daughters of Natal farmers could have the instruction of how to ripen cream, wash and work butter press and make cheese for the market, and rear chickens with Hearsom's incubator. They will by sending their brothers and sons to Cedara School of Agriculture.

The next review was the blacksmith's forge, the carpentry building and farriery. This special new-born life is one of the pulsations of the school that is bringing about the evolution farming requires to keep the time true to the world's competition. In the adjoining building the noise of the new automatic shearing machine gives you the first step into the future of the wool industry in South Africa. How to care for and handle sheep, how to breed for wool and mutton, how to select and judge varieties of merino, the student is so informed that Natal may become the companion with Australia in the wool production for the Homeland.

The Department of Forestry and Horticulture take a large share of the success of the Farm. The nursery work, the raising of trees from seed, propagation, the laying out of plantations, the culture of black wattle, the economic forest products, the beautifying of the College grounds, and the nature and lay of the Farm and its surroundings gives natural help to the progress and development of this branch of Agriculture at Cedara.

The Farm Manager has cereals, root crops, legumes and vegetables of all descriptions on view, and as the Farm soil is naturally wanting in plant fertility much credit is due to the fact that tons of table food finds its way to the College kitchen, and the right application of manures gives an otherwise barren ground the yield of mealies, oats and other crops necessary for feeding the stock on the Farm.

From the use of the muscle we now come to the use of the mind, agricultural botany, the use of plants, bacteriology, their action on food, milk, and plant life, green manuring, zoology, the development and incubation of plant and animal life, combined with agricultural chemistry, soil and its composition, value of foodstuffs, chemistry of plant life, with demonstrations and experiments illustrating the lectures. This is only an idea of the curriculum of the College. If any young man in Natal will concentrate his thoughts and forcefully act by faith to obtain a true agricultural education he has at Cedara willing hands and minds to help him to obtain his ambition, which will not only make the golden days of agricultural prosperity return but will reform the old traditional methods into a new history of farm action, giving prosperity and peace to the whole community.

Cedara's thoughts of truth are things
Endowed with bodies, breath, and wings.
Sent forth into the land to till
The world with good results not ill.

The Living Bee.

By MARY RITCHIE,

President, Natal Bee-Keepers' Association; Natal Expert, South African Bee-Keepers' Association.

(Continued from Page 630.)

IN MARY'S MEADOW.

"You know, you have not told us yet what the botanist said about the bees. Why we were to watch them. Do you remember you said you would some day—that is, to-day?"

"Which botanist?" somebody asks, "Linneaus, or Darwin, or Burbank?"

"No, not Burbank."

"I know, Christian Konrad Sprengel?"

"Hermann Muller?"

"Oh no, Old Parkinson, the one in Mrs Ewing's 'Mary's Meadow.'"

"Prof. Balfour? Mr. Medley Wood? Prof. Bews?"

"No, no, do stop it, you girls; the man with the kind eyes—I mean, above your desk."

"Prof. Geddes, you mean?"

"Yes, Prof. Patrick Geddes. You said you would tell us some day what he said about the bees."

"I think I had better read it when we go back."

"Oh, we need not go back: it is only a fox's wedding: look at the bubbles in the water: that is a sure sign that the rain won't last."

We were clustered for shelter on the verandah of the Science Room for the big thunder drops had begun to fall on our way to the apiary, and the gutters were running rivers by this time. Half an hour later the storm had passed, the great white fleecy clouds floated apart, and the bright, blue sky appeared overhead. It was only a sunny shower after all, and we were soon shaking the jewels it had left from the branches of the wattle trees as we passed through the meadow on our way to the bees.

Meantime Meg had gone for the book, and to the rhythm of the rain drops I read them what Prof. Geddes said about the bees:—

WORKER BEES.

"Natural science for women is not what they think at college—the dissecting of the frog for the anatomists. It is with the child, with the

poet, and the naturalist, from Virgil to Darwin; it begins in gardening, in watching *the living bees*. And this vital science makes use of no hard names; its language, indeed, is simpler than the common. The queen is no queen, but an imprisoned mother; the 'neuters' are no neuters, but the busy sisters of the hive. For the first, the life-long imprisonment, the narrow home of motherhood; for the others, the life of energy and of labour, for them the freedom, the sunlight, and the flowers.

"Here is your contrast of house-mother and new woman—sure enough as old as the world. The passive Hausfrau of contemporary Germany, the New Woman of contemporary America and England, are each as old as civilisation. For oh, good lady friends, for whom society stops exactly at your own particular level of society, did you never see that every one of your domestics is a new woman, a worker bee, who has gone out to labour in the world; that doctor and nurse, teacher and typist, dressmaker, mill girl, shop girl, and all the rest are new women proper—that is, workers—those who call themselves new and advanced, and what not, without working, being only mimics of the buzzing drones? The domestic is nearest the home, and so feels the instinctive feminine interest of this more than do her sister workers of the outer world. She feeds the household, cares for the children, like the good worker-bee that she is.

"But the vast body of working women, other than domestic—how shall we classify them? Obviously, some have distinctly temporal functions; others distinctly spiritual ones. The dressmaker is the fire-woman of the domestic and the mother; the mill girl is the weaver slave of all three. These women workers merely replace men and machines in the factories, which are, as it were, the enlarged work sheds lying behind the kitchen of the typical home.

"Leaving the domestic Martha and her hand-maidens—what of Mary? Hers it is to be type of the spiritual callings; hers the deliberate choice of the better part which shall not be taken away from her; hers the prototype and ideal of all sisterhoods since her day.

"Here appear, in Catholic phrase, the secular orders—nursing the sick, helping the poor, teaching the children, and the like. And these good works satisfy many; witness not only the professed sisterhoods or the incipient ones like nurses, school-mistresses, or parish councillors, and thus assuredly may be lived most serviceable and happy lives.

"We are getting back to the fundamental domestic again, *albeit* now with spiritual basis." (This idea of celibacy would need fuller analysis. It is in Nature; witness the very bees who were our text.) "But just as lover suggests lover of the opposite sex, so fellow suggests fellow, sister suggests sister of the opposite sex—that is, brother. And, despite all difficulties, the true ideal is of co-operation, not separation.

of the sexes. The problem of morals, as of practical life, is not to retreat from its difficulties, but to surmount them, to bring them into a higher equilibrium, so making in short the difficulty an opportunity of higher things.

"What, then, is the normal, the vital condition of the true fellowship, of the ideal sister and brotherhood? How shall we reach this fuller perfection of the human hive? Where has it been expressed in the world? Rarely, dimly, fantastically, if you will; yet surely, in some measure in chivalry, which was no mere temporal ordering of things, but in large measure also was the provisional religion of Western feudalism, and which grappled more boldly than did the too passive Orientalisms to which we have been wont to restrict the name, with the fundamental problems of our daily life.

"In its noblest examples the combination of activity with purity was practically reached; not evaded by help of separate cloister walls, as in the (so profoundly less moral, however superficially more moral) woman this also meant more than affection and constancy, for she might that each sex not only expresses its own quality, its own superiority over the other, but uses this to develop the other.

"The natural courage of the youth was not only developed by the danger of the quest, but refined by its discipline and patience. For the woman this also meant more than affection and constancy, for she might be not his lover, but his lady only, the serene expression of his ideals, or their arousing voice, and thus suggest not only his general line of action, but keep up his moral attitude in it.

"Thus we reach the fullest ideal of the woman-worker—she who works not merely or mainly for men, as the help and instrument of their purpose, but who works with men, as the instruments yet material of her purpose."

"But doesn't he say anything about the queen bee?"

"Yes. 'Let us not over-pity the queen mother,' he says. 'What mother but will smile and say "Pity her? Rather envy her—was I not happiest with my babes?"' In another place he says, 'But Mary, type of sisterhoods, is not the highest Mary, but surely she in whom purity and motherhood unite.'

"We are coming to queen bee now. We are coming to the queen bee, but not to-day. I shall read you what he says some other time."

"Is it about being queens, as Ruskin puts it?"

"More than that: he shows how romance and poetry are truly religious, and how religion lies in idealising and consecrating life, and how love is life and life is love. *Wer Wissenschaft und Kunst besitzt hat auch Religion.*"

Natal Bee-Keepers' Association.

MONTHLY NOTES AND COMMENTS.

By W. J. FULLER.

[*The N.B.K.A. has again a change in its secretaryship. Miss Pulinger, who took office for a time, has resigned, while Mr. W. Stranach has promised to take over the duties about next March. In the meantime Mr. W. J. Fuller has kindly consented to act as secretary, and all communications should be sent to his address, Jesmond Road, Maitzburg, until further notice.—ED.*]

The Treasurer informs me that some few members have not paid up their subscriptions for the current year. I would advise those to hurry and pay up; otherwise they will be deprived of the benefits of the Association.

For the information of those who are about to become bee-keepers, and to readers who are bee-keepers but have not yet joined the Association, the following remarks may be of interest.

The objects of the Association are to bring bee-keepers in touch with one another and to exchange ideas and methods for the encouragement, improvement, and advancement of bee-culture.

To combine so that a fair price may be maintained for the sale of honey produced.

To teach others the value of the honey-bee, not only as a producer of honey, but as the most valuable fertilising agent in the world.

And now a special word to farmers. Mr. Farmer, wake up—that is if you want to get more profit out of your farm than you are doing at present.

Do you realise what you are losing in your orchard by not keeping a few swarms of bees?

Do you know that if you grow fruit, buckwheat, beans, peas, etc., you can increase your yield by 25 per cent.? Your American cousins do it.

Do you know that honey is one of the most nutritious of foods for yourself, and more especially for your children?

can either sell or, better still, use up in your own household.

can neither sell or, better still, use up in your own household.

Mr. Farmer, get your good wife to make a cake, using honey instead of sugar, and you will confess you have never tasted anything better.

Very few people have tasted really nice honey; learn to produce it. You will derive profit yourself and give pleasure to others.

Stings did you say? You dare not keep bees on account of the stings? Well, everybody who keeps bees will get a certain number of stings; but with modern appliances and ordinary care these are reduced to a minimum. The writer has not had a sting for three months, and is working with his bees every week.

One last word, Mr. Farmer. Third hand, and if you want further information send a line to the Secretary.

The subscription is 7s. 6d. per annum, and that is the whole of your liability.

Now, what do you get for your 7s. 6d.? Well, to begin with, you receive 12½ per cent. discount off all bee goods purchased at Shippey's stores, Steel, Murray & Co., and Parker, Wood & Co. Now, that in itself will insure the return of the first outlay to even a bee-keeper who owns only one hive.

You will receive the *Agricultural Journal* free for one year. (If you are already in receipt of this, a refund of the amount paid will be allowed.)

You will be encouraged to exhibit specimens of your year's work at the agricultural show, when valuable prizes are offered. Members are allowed five entries free. You will be given an opportunity of helping the next man.

Bee-keepers! we have helped you. We made strong representation to the late Natal Government, urging upon them the necessity to prohibit the importation of bees and honey which may be diseased with foul brood.

Do you know what foul brood is? It is a foul disease which decimates thousands of colonies of bees in England and America annually.

The Government listened to us, and the law has been passed. This, in all probability, could never have been done without the Bee-Keepers' Association. We want your help and co-operation to protect you and others in any further way that may be necessary; therefore, come and join our Association without delay.

* * *

In future all correspondence will be conducted through the medium of the *Agricultural Journal*. Correspondents who do not wish their name to appear may use a pseudonym, but must enclose their real name and address, though not for publication. For reply by return of post enclose a stamped addressed envelope.

* * *

A Polela correspondent writes:—"I have a hive nearly full of bees. Can I with safety divide this colony so as to make two?"

Yes, this can be easily accomplished.

One method.—First of all get six brood frames filled with foundation and properly wired in. Fix upon the site for your new colony; this, of course, should be in the shade of a deciduous tree, and never in the shade of an evergreen. Set four bricks on edge in such a manner that when the bottom board is placed in position two of the bricks will project at the back four inches. Obtain an Alexander feeder, and pack it up so that it is level with the top of the bottom board, and all is ready.

Now take the old hive and place it on the new stand. Remove two or three frames from near the centre of the hive containing eggs not more than three days old, and place them between four of the wired foundations in the new hive (that is now on the old stand). See that you don't take the queen with you.

Replace with full sheets of foundation in the centre of the old hive. Contract entrances. Most of the field bees will return to the old stand, and will start building queen cells.

Both hives should now be fed with stimulating food, which is made by mixing equal quantities of sugar and water, until they are ready for the supers, which should be in about four or five weeks.

You must, of course, examine the new hive frequently to make sure that the queen is safe and laying properly. Should she have received an accident or been killed in her marriage flight another frame containing eggs must immediately be given to the colony. This is probably the simplest method for you to pursue, but next month I shall publish Alexander's method for general information, which is recognised as the best by more advanced apiarists.

TO PREVENT BEES FROM SWARMING.

Bees can be prevented from swarming in the following way:—The method is to visit every hive and remove two frames of the sealed brood, substituting two frames of foundation, being careful at the same time to leave the queen in the brood nest. This is, of course, taking for granted that, after the first extraction was made, all solid frames of honey were removed and brood combs were given in exchange in the centre. The brood removed may be used for making increase, or if this is not desired, a super may be placed on the top, so that an increase will have been gained from this brood when it hatches out. Such a plan will prevent increase being made too late in the season, with the consequent loss, and the extra work, in order to prevent desertion. The use of swarming cells is not advised, as this tends to cause the bees to swarm all the more. The giving of room in the way that has just been stated is said to be the best means of avoiding the evils of swarming.—*Journal of the Jamaica Agricultural Society.*

Science and the Farmer.

NOTES OF INTEREST TO FARMING EXPERTS.

INCUBATORS may be used in hatching turkey eggs, but my advice is, learn the old-fashioned way first. The hatching is easy enough, but the disposition to roam makes the rearing of it in confinement so far impossible. HERBERT MYRICK (*"Turkeys and How to Grow Them"*).

IRRIGATING LUCERNE.

The critical time with lucerne is the first six weeks of its growth. Flooding during this period is quite certain to give the plants a back-set from which they seldom fully recover before the second, and sometimes not before the third year, and it is not often in the arid States that rain falls with sufficient frequency to dispense with the necessity for irrigating the plants while small. By soaking the earth from thirty-six to forty-eight hours before seeding, however, the plants will make vigorous growth until they are ten to twelve inches high, after which they may be irrigated with safety.—LUTE WILCOX (*"Irrigation Farming"*).

PRUNING TREES FOR TRANSPLANTING.

No matter how carefully a tree may be dug many of the roots will be injured, and with trees that have been dug several weeks, as they often are when purchased from a considerable distance, nearly all the feeding roots are destroyed, and can supply but a small amount of sap to replace the moisture that evaporates from the large number of branches and buds, so that growth starts very slowly or the trees fail entirely. By removing the branches and buds in proportion to the injury of the roots a balance is created. Considerable heading in of the top should be done even if there are but few roots injured, and only a small surface of branches and buds to be supplied with sap, for there will be a much better chance of the remaining buds starting, and they will grow with greater vigour than if no pruning were done.—SAMUEL T. MAYNARD (*"Landscape and Gardening"*).

DAIRY UTENSILS.

Not all of the bacteria that find their way into milk come from the cow or the barn. Often milk pails, strainers, cans, and other utensils used for handling milk are the source of such trouble. Faulty construction of these vessels is very common. There should be no hidden, inaccessible places in milk vessels. The seams should be soldered over

smoothly, inside and out. Cheap tinware is not usually well soldered, and if such is purchased it should be taken to the tinner to have all seams carefully gone over, closing up all that are open and cannot be cleaned. Galvanised iron is sometimes used for milk pails and other dairy vessels, but it should not be, as the galvanising is rough on the surface and affords hiding places for innumerable bacteria. Wooden vessels should not be tolerated, under any condition, for holding milk, for it is impossible to keep them clean. Rusty tinware, besides its effect in imparting rusty or metallic flavour to the milk, is objectionable for the same reason. Good tin is the only practicable material for milk vessels, and this must be kept shining and bright.—EDWIN W. WEBSTER, M.S., Chief of Dairy Division, U.S. Bureau of Animal Industry.

TRANSPLANTING CITRUS TREES.

The system of lifting the citrus trees with a ball of earth still remaining about them and then encasing this in a sack is an excellent one. The trees may be transported long distances and planted out without even wilting the foliage, if the work is carefully done. To lift the trees a trench is dug along one side of the nursery row, about eighteen inches deep and six or eight inches away from the trees. In digging this trench the layer of lateral roots are cut off, and at the bottom the tap-root is severed. The top soil is then removed so as to barely expose the crown roots and a sharp spade is thrust into the soil on the uncut sides to sever the remaining laterals. When all the roots have been cut the tree is carefully lifted from its place. The angles are rounded off and the tree is set on a piece of burlap sufficiently large to completely cover the ball. The burlap is carefully drawn round and tied about the earth. The size of the ball should correspond to the size of the tree. Smaller trees have about forty pounds of earth, larger ones about sixty. This method of digging trees cannot be pursued on loose, sandy soils, but only on those which have sufficient clay to make the ball well about the roots.—H. HAROLD HUME (*"Citrus Fruits and their Culture"*).

GREEN MANURING.

The practice of ploughing under green crops as manures is not very general, and we do not know as much as we should like to know of the value of the method. Some crops do not thrive when sown on land into which a green crop has recently been ploughed. This is particularly true of those crops that like a solid seed bed, or which are sensitive to acids. When a heavy green crop is ploughed under, it goes through a fermentation not unlike that which occurs in a barrel of kraut, resulting in the formation of a considerable amount of acid. Lucerne is particularly

sensitive to acids, and it also requires the land just before seeding to lucerne. The cereals, particularly wheat and rye, do not do well after a green manure. On the other hand, potatoes and maize are not seriously injured by green manures. In fact, potatoes are benefited by them, since the resulting acid condition of the soil prevents the development of potato scab. Generally speaking, when it is desirable to plough in a green crop before fall-sown crops, it should be done a month or six weeks before planting time, and the soil should be harrowed frequently or otherwise compacted. A few good rains will wash out most of the acids and aid in compacting the soil. The acid may also be counteracted by adding lime.—W. J. SPILLMAN, *Agriculturist in Charge of Farm Management Investigations, U.S. Bureau of Plant Industry.*

MORE "DON'TS" FOR POULTRY-KEEPERS.—Don't neglect keeping fowl-houses dry, clean, and free from vermin.

Don't fail to let plenty of sunlight into your fowl-house.

Don't fail to keep oyster-shell or lime, and sharp grit, always before your poultry.

Don't forget that long-legged birds are seldom good layers, and, as a rule, are deficient in breast-meat.

Don't breed from loose-feathered birds; the tight and abundantly feathered are usually the best layers.

Don't forget that the breeding-pen must be dry to get a good percentage of fertile eggs.

Don't fail to give your birds green feed if the grass has become long and rank

Don't fail to grow all the green feed required if you have space.

Don't grow heavy-boned birds: it is meat that is wanted, not bone.

Don't forget that a medium-sized bird of its breed is generally the best layer: large birds are prone to fat.

Don't compel good layers to support the drones: an idle hen is never a good layer.

Don't go into the poultry business if you have to depend entirely upon hired help; do the technical part of the work yourself.

Don't waste time trying to cure persistent cases of disease.

Don't feed chicks for forty-eight to sixty hours after they are hatched; feeding too soon will cause indigestion and bowel-trouble.

Don't forget to feed chicks a little and often; the drier the food the better.

Don't keep an old hen because she has some peculiarity about her; there should be no sentiment about poultry-keeping when it is a question of making a living out of it.—(*Agric. Gazette, London.*)

The Position of East Coast Fever.

OUTBREAKS DURING OCTOBER AND NOVEMBER.

THE Chief of the Veterinary Division (Mr. W. M. Power) furnishes the following list of outbreaks of East Coast Fever that have occurred during the period 21st October to 15th November:—

Newcastle Division.—Outbreaks on the farms “Langklip,” west of line; “Zuurbult,” west of line; “Welgedacht,” west of line; “Droogdal,” west of line; “Waag Alles,” west of line.

Estcourt Division.—Outbreaks on the farms “Noodhulp,” “Cathkin” (sub-division of “Oppermann’s” Kraal), “Hill Grove,” “Blue Bell” (sub-division of “Doornspuit”), “Lot 115” (sub-division of “Plessis Laager”), “Smallhoek” (sub-division of “Driefontein”).

Umvoti Division.—Outbreaks on the farms “Newstead” (sub-division of “Cragieburn”), “Setatin” (sub-division of “Petrus Vlei”), “Louisdale” (sub-division of “Driefontein”).

Polela Division.—Outbreaks on the farms “S1,” “S8,” “S9,” “S10,” “S11.”

Richmond Division.—Outbreak on the farm “Meyer’s Hoek.”

Dundee Division.—Outbreaks on the farms “Vlei Poort,” west of line; “Cragieburn,” east of line; “Droogdal,” west of line.

Klip River Division.—Outbreaks on the farms “Home Farm” (sub-division of “Small Hoek”), west of line; “Lombard’s Kop” (sub-division of “Modderspruit”), west of line; “Black Crag” (sub-division of “Quaggar’s Hoek,” adjoining “Waterkloof”); “Hursley” (sub-division of “Danse Kraal”).

Lower Umzimkulu Division.—Outbreaks on the farms “Beedale,” “Beedale C.” (sub-division of “Beedale”).

Alexandra Division.—Outbreaks on the farms “Omdurman,” “Pulumbane,” “Mayfield” (shown on the map as “B.3.”).

Weenen Division.—Outbreak on the farm “Vrisgewaagd.”

Pietermaritzburg and Umgeni Division.—Outbreak on the farm “Braeburn.”

Jozopo Division.—Outbreaks on the farms “Location” (adjoining “Flettsburg” and “Gracourt”), “Cleveland” (consisting of “C.W.” and “Ravine No. 2”), “Seven Fountains” (consisting of “Crystal Manor,” “Watershed,” “Barkley,” “Lot B.R.,” “Goodlands,” and “Kedron”), “Carrisbrook” (shown on map as “Lot 9”).

Lion’s River Division.—Outbreak on the farm “Weltevreden.”

THE FARMER BOYS' PAGES.

Conducted by "ARATOR."

MONTHLY ARTICLES, NOTES AND PARAGRAPHS ON
ELEMENTARY AGRICULTURAL SUBJECTS



AND NATURE STUDY NOTES

FOR

BEGINNERS IN AGRICULTURE AND STUDENTS GENERALLY.

Nature Notes for December.

THE days are their longest, loveliest, for summer is the noon-day of the year. Day after day there is the same blazing sunshine, the same cloudless sky, the same heat-haze on the hills. It is the time of fullest foliage, and the gardens are a blaze of colour.

The yellow roadway loses itself in the tall grass, which has also burst into flower. The short, twisted, flat-crowned trees that dot the slopes throw faint shadow on the green sward, but here and there there are clumps of bush that lie wholly in the shadow of the hills, and forests of young bamboos that afford pleasant dwelling for the fairy folk.

The flowers pass in quick succession, each more wonderful, more beautiful, than the last, from the creamy sprays of wild asparagus to the strawberry-coloured blossoms of the bright flamboyant that crown the summer.

In the winter, when the bouganvillea is in blossom, there are foot-paths, but when summer comes with its flood of blossom it sweeps them out of sight, and there is just one broad sheet of colour—the gaillardia is like a field of marguerites, dyed all the colours of the rainbow; the cannas wear their gayest robes, red checked with yellow, yellow flamed with red.

There are gay flowering shrubs from many lands with rare and curious flowers and old familiar blooms; carnations and dahlias and fox-gloves, full of memories of a land where the sunsets are less gorgeous, no flaming red and gold, but quiet, grey, and tender.

But Father Christmas has come, in best fur cap and giant muff, and he smiles from out his frosted beard at the thermometer registering 100 deg. in the shade!

M. R.

THE VOICES OF NATURE.

"The voice of the sea is the voice of sorrow, the voice of the mountain is the voice of prayer, the voice of the forest is the voice of love."

I.—THE VOICE OF THE FOREST.

HAVE we not all heard the whispering of the woodland which lures us deeper and deeper into the hidden places, with hinted promises that we shall there at last find our heart's desire?

As children we have felt the fascination of those fairy tales, which told of enchanted castles and spellbound palaces hidden away in the heart of a wood; and we have entered into the spirit of the fairy prince, who fought his way through briar and tangle, and thorn and thicket, until at last he discovered the sleeping beauty who awaited him there.

And even children of a later growth feel the spirit of that fairy prince still stealing over them when they stand in the midst of a forest on a summer's day. Then suddenly all the stories of chivalry and romance become possible. Forest lovers may be found resting under any bush: gentle knights may be seen pricking across any glade. Each tree whispers to us its magic secret; each grassy path beckons us to follow it until we find our beloved awaiting us in a banqueting house whereof the beams are of cedar and the rafters fir.

Every pilgrim of life at some time or other passes through Arcady; every wanderer's path goes by way of the Forest of Arden; and even though we may have travelled a long way since then, and our feet be weary and our faces worn, Arden and Arcady come back to us once more when we stand on a summer's day in the heart of a wood.—E. T. FOWLER.

THE COLLEGE GARDEN.

"God Almighty first planted a garden, and indeed it is the purest of human pleasures: it is the greatest refreshment to the spirit of man, without which buildings and palaces are but gross handicrafts, and a man shall ever see that, when ages grow to civility and elegance, men come to build stately sooner than to garden finely, as if gardening were the greater perfection."

THE *raison d'être* of one of the earliest Botanic Gardens—that of the famous "Jardin des Plantes," in Paris—is said to have been the supply of fresh bouquets to court ladies. Scientific reasons have since then outgrown the artistic, but there is no reason why these should not be united in our College garden.

Our first task is to see the ground as it is. Our second task is to imagine what it might be, and our third to make it a Plaisance a place of delight, of sweet scents, and pleasant shade—the garden of our dreams.

After much discussion, and repeated failure, we succeed in drawing a map to scale, showing the principal natural orders, with some regard to such questions as situation, soil, and aspect. On one point we are all agreed—that here, by the sluic, our bog garden and nursery must be. From the water lilies, with their large floating stems, from our prostrate mosses by the water's edge, we come to those plants that stand erect, and here our reeds and rushes, flags and arums, find their home. From those that grow by the water side we pass to others that, like the gay tritomas, have climbed upon the bank, but still love moisture and shade.

Here, in some low-lying spot, our ferns will grow, and make a little green world by themselves—a shady, cool retreat, in which eyes, tired of study, will rest and be refreshed. The lilies we shall plant upon the

sunny slope; their poor relations, the grasses, on the lower side; their grand friends, the gay orchids, on the higher. Lilies—what a wonderful succession! First, the fire-lily, a tongue of flame; Ifafa lilies, with fairy trumpets, gold and silver; stately fleur-de-lys, bearing aloft their purple crowns; yellow day lilies, catching the sunbeams in their golden cups, and dying with the light; lilies pale and pendulous, casting perfume on the night; lilies gay and fearless, rolling back their leaves of scarlet-orange to the sun-lit day.

By the path, yuccas with silver bells, cycads, and palms; here a tall aloe towering overhead, and there a beautiful *Strelitzia*, whose flower the children call “the bird of Paradise.” Beyond is the rose garden; the path to the left the garden of commerce, where we shall grow economic plants, plants used for food, and medicinal plants, tea, coffee, and castor oil; plants like cotton, hemp, and indigo, that are useful to man, and some, like the Bermuda Cedar, used to make pencils for our artists.

The path to the right leads to the Arboretum. Here you may sit and listen to the rustling of the leaves, for there are leafy trees from other lands—from England and Australia, from India and Japan. Flowering trees there must be, like the Jacaranda, the blue tree from Fairyland, and Cassia, a bush of yellow flame, the strawberry-coloured Flamboyant, the lilac Cape Chestnut, the deep-red Schotia, and the scarlet Kafir-boom. Climbers we shall plant from the strong Bouganvillea, with its long green boughs, all blossom laden, the gay Solanums, and sweet-scented Ipomeas, to sweet peas “circling all about with fairy rings.”

Here, set in the quiet green lawn, are flowering shrubs like *Brunfelsia* (Francesa) and *Beaumontia*, *Tecoma*, and *Urdca*, and here our representative flower beds—our Natural Orders, our type Botanic Garden. On the right, the time-worn buttercup, with its cousins and second cousins, clematis and anemone, larkspur and peony. On the left, the daisy flowers, with their relations, cosmos, and sunflowers, gaillardias, zinnias and coreopsis, dahlias and chrysanthemums. On the one side, hibiscus, abutilon and high hollyhock; on the other, stately foxglove, tall mullein, snapdragon and mimulus, bright salvia, lavender and thyme, marjoram and rosemary. And others, such as wall-flowers and nasturtiums, poppies and carnations, pansies and mignonette, flowers full of haunting memories of the Homeland.

But this is not all. There are by-paths in our garden, as in our science, even more delightful than the highways. A floral clock, for instance, round the sundial, marking, by the opening and closing of the blossoms, the passing hours; a garden of memories, where each student, on leaving, will plant a favourite flower; a poet's garden,

Shelley's shy, sensitive plant, and the violets Shakespeare loved; and all plants famed in song and story, Pomegranate, Lotus, and Asphodel.

Surely health and happiness await us here. In actual contact with Nature, and our hands in the warm brown earth, there is much to learn, much to enjoy. Our love of flowers grows more and more as our knowledge of the wonders and mysteries of plant life widens and increases, and at all times of the day there is much to be seen and done from the first faint flush of dawn till the sun sets golden at the gates of the west.

Will friends in all parts of the Colony help us by forwarding seeds, cuttings, bulbs, or roots; anything that will transform our barren veld and aid us in the realisation of our dream.

MERCHISTON SCHOOL GARDEN.

"PLEASE may I have a garden?"

This is a request not to be refused, so a consultation is held as to how the applicant can have a corner to work in and cultivate his own plants. This problem being solved by making a group of busy workers a little larger, another happy face is added to the throng.

Oh! the rooting-up, digging, delving, planning, and planting that goes on! It must be surprising to the plot of ground that has always had its one gardener to work it in a quiet, leisurely way without undue bustle or excitement.

Nowadays it is quite an event when a carnation bloom or any other flower begins to unfold; probably its proud owner immediately picks it to present it to "Sir," who smilingly declares it will be necessary to have at least a dozen buttonholes made on each side of his coat to hold the daily floral tributes.

Alas! all plants do not reach the supreme consummation of flowering; many are cut off in their early youth.

Hot winds blow for a whole day just as a lovely bed of baby seedlings has been planted out; or, sadder still, in our anxiety to care for and nourish the nurslings, they are fed and tended "not wisely but too well."

One little bed was devoted to sweet peas. The owner had visions of unlimited blooms of every hue; many times daily it was visited, and a whisper went around that some of the seeds were unearthened and minutely examined to see if they were sprouting. At last the little green shoots appeared. Care and attention was redoubled; hopes ran high; the plants stood at least three inches above the ground; stakes

were prepared for them; all went merry as a marriage bell. But what happened? Some insects discovered the succulent little shoots, and made a furious attack on them.

Stringent measures had to be adopted, and one evening, going round the corner, a pungent odour greeted our nostrils and almost drove us back. Curiosity, however, braved the strong scent, and we discovered a band of workers diligently dosing the sweet peas with sheep dip. Gentle reader, "If you have tears prepared to shed them now, for, as my companion has since observed, I never knew sweet peas till the day before they died." Sweet peas are but a tender memory this season. Never mind, we have just planted a regular forset of Hilton daisies, and hope to have an absolute blaze of colour in our garden before long.

Fiercely must we wage war with the weeds, which grow so quickly and threaten to smother our treasures, so to-day we played we were great giants and rooted up whole forests of them. When we had finished the garden looked so bare we had to implore an ordinary mortal to take a ricksha and big basket to a friend and beg for cuttings, roots, and layers to fill up the bare spaces. Now we are causing great floods to cover the land in order that they may grow quickly.—J.W.

TRANSPLANTING POPPIES.

THE early heat in parts of America made the growing of many of the larger annuals a great difficulty, as they could not be sown out of doors early enough. But one lady, determined not to be beaten, grew the single seeds in empty egg-shells stuck into boxes of sand. When the time came for planting, and the little seed had grown, the shell was just broken, and the whole thing dropped into the ground where it was to grow. In this way she got poppies, etc., to flourish—plants that will not bear moving at all as a general rule.

This is an example of the whole spirit of gardening—a patient conquering of difficulties. Riding on the crest of the wave that tries to submerge us is one of the phases of our existence that makes life most worth living, and is, indeed, the secret of all progress.—"POT POURRI, FROM A SURREY GARDEN."

How to Draw a Plan to Scale.

THE first thing to be understood before an existing plan can be "read" or a new plan made is the use of scales. Every plan or map is drawn to scale—that is, every inch or portion of an inch represents an equivalent distance on the ground, foot, yard, mile, as the case may be. The

scale used depends on the size of the plot. To make it quite simple say that one inch on the paper represents one foot on the ground. On an ordinary sheet of foolscap we can draw the plan of a plot 6 ft. x 12 ft.—i.e. 6 in. x 12 in. on the paper. If the plot to be represented is larger, we must choose a different scale, and make 1 in. represent 2 ft., 10 ft., 15 ft., 40 ft., 80 ft., or more.

If the plan is drawn to the scale of 1 in. to 1 ft., and the distance between two points on the paper is 2 in., then the distance on the ground is 2 ft. Again, if the scale be 1 in. to 4 ft., and the distance between two points on the paper be $\frac{1}{2}$ in., then the distance on the ground is 2 ft.

The scale to which a plan is drawn is generally shown on the plan or a note is made that the plan is so many feet to the inch. The divisions and sub-divisions should be numbered. The numbering begins on the right hand side of the sub-divided portion, the inches reading to the right and the sub-divisions to the left.

Although the scale should always be drawn on the plan itself for reference, it will be found very much easier to use a detached scale. This detached scale can be laid directly on the points and the distances read off at once.

Notes of Excursions.

We went to the Gardens yesterday (15th November, 1910)—twenty-eight of us little girls and two teachers—and had a perfectly lovely time. It was a beautiful day. The car leaves at twenty minutes past one, but we left at one to be in time. The car hurried along, and in ten minutes we were in the country, green grass and dear little baby lambs and baby foals. Then minutes more we reached the Gardens. The water was lively, splashing over the stones and all the ferns and lilies. We looked at all the trees that were in flower; round all the flower-beds, columbines, and larkspurs, and foxgloves and snapdragons, and at some lovely crimson lilies from the Cape; then to the pond to feed our friends the 'ducks, to the tree with the chucks' nests—found two unfinished ones—then to the river. It is really only a big stream. There are stepping-stones, and it was great fun getting across. Then we sat down and talked about leaves—sleepy leaves, and thirsty leaves, and shady leaves. It was so lovely we decided to catch the later car, so we scattered and gathered wild flowers and ferns to put in the school garden.—III
STANDARD, Longmarket Street Girls' School.

Spring Studies.

III.—LEAF BUDS AND BABY LEAVES.

HOWEVER much we may be expecting these tiny leaf-buds, they are almost certain to take us by surprise. One after another they come peeping out as though each in itself held the joy of the spring.

The mother tree takes great care of the baby buds, and wraps them up tightly that they may not catch cold. You have seen the pale pink shining leaves around the buds, stiff like scales, so like, indeed, that they have been called bud-scales. These scales protect the buds until the spring.

On some plants they survive and grow into foliage leaves, but usually when the spring comes the bud-scales drop off. The prettiest bud-scales to be seen here are those on the fig trees, particularly on the beautiful *Ficus macrophylla* or Morton Bay Fig.*

Some young leaves are waterproofed over with an exudation of resinous varnish; others are warmly lined with epidermic down. The mulberry leaves, for example, come in tight-fitting waterproofs, while the young loquat leaves arrive in heavy greatcoats richly lined with silver fur. The bees gather this varnish from the buds in the early morning, and use it to make their hives watertight. They seal up every crack and crevice with it until there is not an opening left large enough to let in a rain drop.

When the bud-scales drop off and the buds unfold we observe the different ways the leaves are folded in the bud. There is no need to dissect the buds; all we have to do is to watch them as they open of their own accord. For the closer examination of a bud we might take a cabbage and split it in two. In the centre there is a portion of stem tapering to a growing point, and round it, springing from different levels, layers of crowded crumpled leaves covering the growing point, layer after layer. Just as the older leaves of the cabbage enfold the younger ones so with the bud. The cabbage is a giant bud.

But the leaves are not always crumpled. There are various ways in which they are folded and packed up in the bud. Some are rolled, some twisted, some folded flat (Kafir boom), and some fan-wise (vine). The fern is curled inwards; the canna is rolled round on itself. The young banana leaf forms a long green telescope, a favourite place for the bats to make their nests.

Some leaves are arranged opposite each other in opposite pairs (Uhdea), some are alternate (ivy), many are arranged spirally (Avocado pear) like the scales on a fir-cone.

* You pass a row of these beautiful trees every time you go to the Beach in Durban.

It is easy to make a model of this spiral arrangement by means of an elastic cord and paper leaves. Let the elastic cord stand up for a stem. Wind round this in ascending spirals at regular distances a string bearing paper leaves. Allow the elastic cord to contract, and the leaves will bend to assume the position such as occurs in Nature within the bud. Twist the cord, and the leaf spiral becomes more crowded and complex; the leaves, therefore, more perfectly packed one upon another. In this way by twisting tightly we may produce the growth spirals of different plants.

What is the use of this spiral arrangement? It determines the position of the leaves on the future stem. Thus each leaf, by being kept out of the shadow of its predecessor, is able to obtain its full share of the sunshine.

You have heard people say that babies are all alike. As they grow older they differ more and more. So with the leaves: they are much more alike when they are young than when they are full grown. As the young leaves unroll each tree acquires a beauty and character of its own. It is itself to its finger tips.

As a rule most leaves are a bright, fresh green, but not always. Some are grey, some golden, others crimson-tipped. Recall the bright red leaves of the castor-oil plant, the rich copper colour of the Virginia creeper, or the loquat and Uhdea's silver grey. Sometimes the colour is so pronounced as to alter the whole appearance of the tree—*e.g.*, the warm sepia of the mango leaves, the bright copper of the cherry trees. We have seen, then, how the young leaves are (1) protected, (2) folded, (3) coloured.

Agricultural Chemistry for Beginners.

By ARCHIBALD PEARCE.

CHAPTER XII.

THE CONSTITUENTS OF PLANTS.

THE life-history of plants begins with the seed, and in most cases the seed consists of at least two parts—the germ or true seed, from which the future plant is developed, and a store of plant food to nourish the young plant until it has gained sufficient strength to forage for itself. When a seed is planted under favourable conditions of warmth and moisture it springs into life, and grows in two directions, sending roots down into the soil and a stem upwards towards the air and light. If we

take almost any seed and place it upon flannel, always kept moist, it will germinate and grow freely for a short time, but will soon die. This early growth can go on only so long as the plant can find food in itself; when its store is exhausted it starves to death for want of its appropriate nourishment. Let us examine of what this nourishment consists. First of all, if a fresh green plant be dried in an oven or in any other effective manner, we shall observe that it loses a very large proportion of its weight, often as much as 90 per cent. This loss represents the amount of water it contains. The remainder, or dry substance, contains all the other constituents; for the rest of the present chapter it is to be understood that in speaking of plants they are referred to in the dry condition.

If a whole plant, roots, stem, leaves, and all is reduced to ashes, we shall find these to be but a very small part, from one to seven or eight per cent. of the whole; the larger portion of the plant, then, is clearly composed of organic substances, which, as we know, are dissipated as gas by the action of fire. Now the remaining ashes, the mineral or inorganic portion, form, with slight exceptions, the contribution which the plant has demanded from the soil; the organic portion, consisting chiefly of oxygen, hydrogen, carbon, and nitrogen, has, with the exception of the last been derived from the air and water which the plant has used during its life. It will thus be seen that comparatively a small quantity of mineral food is required; but it is just as necessary for the plant's growth as the larger proportion of organic material; one will not do without the other, nor will an increase in the one compensate for a deficiency of the other.

To find out of what substances the inorganic food of a plant consists we naturally subject the ash to a searching analysis. In this way we find great differences existing between various kinds of plants; practically all kinds are found to need the same substances, but the proportions in which they need them vary very considerably. The largest part of the ash of plants is found to consist of potash, lime, phosphoric acid, and carbonic acid; with these are found small proportions of magnesia, soda, silica, iron, chlorine, sulphuric acid, and occasionally traces of other elements. Accordingly the first four of these will be the substances which exercise the greatest influence in encouraging plant growth; the fourth, being derived from the air, is unlimited in amount, and the practical outcome of this is that in manuring soil the first three, together with nitrogen, are almost the only substances taken into account. The minor constituents are needed in much smaller quantity, and are so generally found in soils in sufficient amount that their applications as manure is seldom necessary.

The root of a plant is the organ by means of which it obtains its

nourishment from the soil, and the absorption takes place principally at the point of the fine root-hairs and fibres into which the main root divides itself. These are connected with the upper portions of the plant by a system of delicate tubes, and it is evident from this fact that it is only when its food is in a liquid form that a plant can absorb its nourishment. Hence arises the attention which is always given to the solubility of the substances of which plant-food is composed. To assist in reducing these substances to the soluble form the roots of plants are provided with a sap which is slightly acid, and by this means many compounds which are not soluble in pure water are dissolved and rendered available. Such a one is the reduced or di-calcic phosphate. Still, this acid is very feeble, and its effect is seldom powerful enough to provide the plant with a full supply of nourishment from a soil containing most of its nutritious elements in the dormant condition. The plant must be assisted by other agencies, such as the application of soluble manures and the active tillage of the soil.

Besides the constituents found in the ash of plants, there is one other which the soil has to supply, and that is nitrogen. The nitrogenous compounds found in plants are entirely organic; accordingly they are decomposed by the process of burning, and the nitrogen dissipated, so that no traces are found in the ash. The nitrogen is wholly obtained by the action of the roots, and almost entirely in the form of nitrates, as has been explained in treating of these salts. The further powers of absorbing nitrogen possessed by leguminous plants have also been discussed.

The organic compounds found in plants, while legion in number, are principally composed of oxygen, hydrogen, and nitrogen, together with the indispensable carbon. Still, numerous as they are, they can nearly all be divided into classes, the members of which closely resemble one another, both in composition and properties. Of these classes the first and most important includes a group of bodies known as the carbohydrates, consisting of carbon united with oxygen and hydrogen in the same proportions as they are found in water. In this group are cellulose, starch, sugar, and gum. Cellulose, or woody fibre, forms by far the largest portion of the plant, and is found in almost a pure state as cotton-wool and linen. Starch is the next most common of this group, and is found in large quantities in most grains, in many tubers like the potato and arrowroot, and also exists in less proportion in nearly all parts of the plant. The sugars are mostly found in the juices; there are a number of different varieties, such as cane-sugar, found in sugar-cane, imphee, maize, etc.; glucose, found chiefly in fruits, and others of less common occurrence. Nearly all are capable of being fermented

—that is, of being converted by the action of yeast-germs into alcohol and carbonic acid.

The second group contains the oils and fats, which are present to a greater or less amount in all plants, but chiefly in the seeds; in some seeds, such as linseed and cotton-seed, the proportion is very large. These fatty substances are similar in composition to the animal fats; they consist of a very large proportion of carbon, over 75 per cent. in many cases, the remainder being oxygen and hydrogen.

The third group consist of the substances called albuminoids of proteids, containing, in addition to carbon, oxygen, and hydrogen, about 16 per cent. of nitrogen, together with small quantities of phosphorus and sulphur. Albuminoids are found in the animal body as well as in plants, and the best known examples are the gluten of wheat, the white of egg, and the casein of milk.

These three groups of organic compounds, the carbohydrates, the oils and fats, and the albuminoids, form, together with the mineral or ash constituents, almost the whole of the substance of plants. The chief object of growing agricultural crops is to provide food either for the human race or for live stock, and for this reason the above classification of vegetable constituents has been chosen as the most suitable for our purposes, because it illustrates and explains a subject of the widest interest to the farmer—*viz.*, the properties of various foodstuffs, which will be discussed in the next chapter.

What is Ensilage ?

THE term Ensilage designates the system of storing green food by exclusion of air. The most general method is to store the food by compressing it in a silo; but many are now successfully making stack-silage—green food built into an ordinary open-air stack, and pressed by mechanical or other pressure so as to expel and keep out the air.

The silo is usually lined in the sides and ends with concrete; and while some have erected wholly new silos at considerable outlay, others have transformed pre-existing buildings into excellent silos at very little expense.

The food is put into the silo, either chaffed or long, in a green condition, full of its natural sap. It is spread evenly over the silo, and tramped firmly by men as the filling goes on. . . . Crops of great variety, and several of them differing essentially in character, have been tried in the silo, and, as a rule, the results have been satisfactory. Soft "fleshy" substances—such as prickly comfrey and turnip-tops—have not done well; but grasses, clovers, vetches, maize, all kinds of cereals, hop-vines, and other crops have all been ensiled with complete success.—R. O. PRINGLE (*"Live Stock of the Farm."*)

The Principles of Manuring.

VIII.—NITRATE OF SODA.

THE next manure to which we may devote our attention is nitrate of soda, or, to use the correct chemical designation, sodium nitrate. This is now the chief artificial nitrogenous fertiliser in use. This manure and sulphate of ammonia (which we shall consider later on) have taken the place that Peruvian guano once occupied on the market. Nitrate of soda is obtained from large deposits found chiefly in South America. Commercial nitrate of soda, which contains about 95 per cent. of pure nitrate of soda and about 15½ per cent. of nitrogen, is equal to 19 per cent. calculated as ammonia. One of its remarkable properties is the readiness with which it dissolves and becomes diffused in the soil.

Nitrate of soda is chiefly applied as a top-dressing, in order to minimise the risk of loss by the washing down of the nitrogen by rain. On account of the great degree in which nitrate of soda spreads through the soil, it is of value in encouraging the growth of deep roots, since the manure naturally sinks to the lower levels of the soils and the plants send down their roots after it. This means that the plants are better able, on account of their deeper roots, to withstand drought than are plants that have shorter roots. In this connection it may be remarked that nitrate of soda is considered to be a better manure to apply in dry seasons than sulphate of ammonia, because it is supposed to have an effect upon the mechanical properties of the soil, increasing its power of absorbing moisture. At the same time we must remember that only very small quantities of the manure are applied as compared with the bulk of the soil, and its effect upon the mechanical conditions of the soil cannot be very great. That it has some small effect is very possible, but we should not go further than that.

Nitrate of soda is a valuable manure for cereals, for the purpose of giving them strong, healthy stems, without which they cannot form and develop the maximum quantity and quality of grain. At the same time, the use of nitrate of soda, or of any other commercial nitrogenous fertilisers, is not to be unreservedly recommended for this country, for various reasons. It is better, in most cases, if it is required to add nitrogen in the soil, to do so either by green manuring, or by first growing a leguminous crop such as soy beans, cowpeas, ordinary field peas, beans or earth nuts, which leave a residue of nitrogen in the soil obtained from the atmosphere; or another plan which has been recommended is to grow a leguminous crop in conjunction with the cereal—say, mealies—in alternate rows. I am describing the various commercial nitrogenous

fertilisers so that the reader may not be ignorant of these various manures and of their value when occasion may require the uses of them on his land.

For root crops—mangolds, swedes, sugar beet, etc.—nitrate of soda is used by many. Its value for these crops is not universally admitted. For beetroots, however, it appears to be a valuable manure, and experiments have shown also its value for mangolds. For all crops, however, it may be safely used, of course with the exception of leguminous plants, which are able to obtain their nitrogen for themselves from the air. From 1 to 1½ cwt. is the usual rate of application, which quantity may be increased to 2 cwt. for strong clay soils; and for mangolds even as much as 3 and 4 cwt. to the acre has been profitably employed. In order to secure uniform distribution it is as well to mix it with dry earth before applying it.

(To be continued.)

Some Orders of Insects.

By CLAUDE FULLER.

(Continued from Page 544.)

ORTHOPTERA.

So far we have dealt with the smaller order of insects, and we now come to one of the great orders, the Orthoptera, or straight wings. Six families constitute this order, all of which are common and familiar creatures, known—as cockroaches, Hottentot gods, stick insects, grasshoppers, tree-locusts, and crickets. Our first illustration is that of a praying mantis, or Hottentot god. The straightness of the upper wing cover is seen, and under it lies the flying wings folded in straight plaits like a fan. Here is shown the same creature feeding upon an insect which it has captured, and holds with its pair of remarkable raptorial forelegs. These insects, being predaceous, are generally to be regarded as beneficial, and their meek devotional attitude is extremely deceptive. The eggs are laid in masses covered by quantities of secreted matter, and these are shown in the next picture. The young, immediately upon emerging from these eggs, cast their skins, and assume a form very like to that of their parents; indeed, one of the characteristics of the order Orthoptera is that the young very much resemble their parents when born, and gradually arrive at maturity without any violent change of appearance or entering upon any resting stage, as do the moths and butterflies, for instance.

The members of the next family are peculiar for their likeness to sticks, a resemblance which gives them a passive means of defence against their natural enemies. Many have some general likeness to the Hottentot gods, especially the winged forms, but they are quite different in their habits, feeding upon green foliage, and dropping their eggs singly upon the ground, whilst the fore-legs are, of course, of a very different nature.

The next family is that of the grasshoppers, with at least one species of which, the red wing plague locusts, we in Natal are only too familiar. This insect and its confrere, the brown locust, have been responsible for enormous losses throughout South Africa for years past, but, chiefly owing to the example set by Natal and the practical means of dealing with this pest developed by the Natal Government, both pests are to-day under control. Although the future is bound to bring with it fresh visitations, it may be said that no Government, with the results of the past before it and the benefit of complete organisation at hand, will stand by and let them get the footing and hold that they have had in past years. Further, with the results achieved at hand, it is now the duty of the South African Government to study this pest far afield, and, if any abnormal development is discovered, to finance its destruction where it is breeding rather than wait for any southward migration. The next slide shows a form of parasitism to which locusts are frequently very subject. The parasite shown emerging is a large hematode worm, which, in an earlier stage of development, was no doubt acquired by the locust in feeding. Of course, many hematode worms are injurious both to vegetation and animals, but their invasion of insects' bodies is ofttn difficult to explain, as such as attack insects usually spend their first stage in water, often having intermediary hosts before they gain an entrance into the insect.

Leaving the grasshoppers, we next come to the locustidae, or long-horned grasshoppers, or, better still, the true locusts. It will be seen that there is quite a mix up as regards the nomenclature of these two families. Our illustration shows an insect known as a "katydid" in America, because in their chirruping they seem to say "Katy did, Katy did, Katy didn't," but what she did or did not do must, I am afraid, ever remain a mystery, for our little insect friend is very discreet, and never says more than what I have told you. This picture also supplies us with an illustration of protective resemblance, the insect resembling a leaf both in colour and in the venation of the wing covers. The tree locusts lay their eggs in a row in or upon the margin of leaves, and never in pods in the ground, as do the grasshoppers and plague locusts. The last family of straight wings are the crickets, with which all are familiar, and of which are destructive.

HEMIPTERA.

We now pass to the next great order of insects, and one which contains many diversified forms, all more or less related, however, and forming a natural division. The prominent families of the order are the true bugs, the cicadas, or singers, the frog-hoppers, the scale insects, and the aphides. These insects are all suctorial, pumping up their food (whether animal or vegetable) through beak-like mouths, and in a liquid form. Further, they resemble the orthoptera inasmuch that the young are like their parents, and their growth is one gradual evolution from youth to maturity.

The true bugs, of which a few typical illustrations are shown, are distinguished from the other members of the family, first by the structure, and, secondly, by the method of folding the wings, which are folded horizontally on the body, the tips of the forewings overlapping. They are further differentiated by the fact that the beak arises from the tip of the head (soldier bug). The remaining members of the order carry the wings slanting pentwise over the back, and have the beak arising from the hinder and lower portion of the head. Our next illustrations show the development of the cabbage bug, and a small bug closely allied to a species which does considerable damage to wattles in Natal, and belongs to a group which have the abnormal habit of laying eggs within the stems of their host plants. At the head of the next section of the order we have the cicadas, or singers, as they are called in this country. In the words of the ancient Pliny: "Happy cicadas, thy females have no voice." The adults illustrate the peculiar attitude in which the wings are carried. The cicadas are very interesting in their habits and development. In the first place, with the aid of a rasping ovipositor, they insert their eggs into the stems at the tops of trees. Sometimes, when in a hurry, the females have been seen making an energetic but fruitless endeavour to cut into fence posts and iron standards, showing a vast want of appreciation of the limits of their capabilities. The young, on emerging from the egg, fall deliberately to the ground, into which they burrow with the aid of their strong digging forefeet. Here they live, feeding upon the juices in the roots of the plants. In time, perhaps in twelve months, perhaps in several years—in one case no less than seventeen—they arrive at their full growth. At this stage they burrow upwards, emerge from the soil, and climb up some adjacent plant, much resembling in form an active chrysalis. Having climbed some way, they rest awhile, and then the outer skin hardens, splits along the back, and the adult creeps out. These hard-cast shells of the last moult are even more familiar objects in Natal than are the adults.

Next we come to the frog-hoppers, mostly grotesquely-formed little

creatures, which feed upon the juices of plants. Our best-known frog-hopper is the spittle bug, which is frequently met with showering drops of watery secretion. The next two families are represented by the psylla, which so frequently distorts the foliage of citrue trees, and the white fly, commonly met with upon palms. These insects must resemble scale insects in their earlier stages, and the psyllids are not unlike aphides when adult.

The next family, the plant lice or aphides, supply many plant pests. They are small delicate creatures, injurious only because of the hordes of them that occur upon the infested plants. Our illustration shows a very common form of aphis attack—that of the rose aphis. The numbers in which aphids suddenly appear are due to the mode and rapidity of reproduction which is characteristic of the family. All the creatures seen upon the rose buds are stem mothers. These creatures reproduce their kind automatically, so to speak, for there are no males. When four days old they start giving birth to five to ten young ones a day, and so an original stem mother has not to live very long before she is many times the great grandmother of millions of descendants. Like the Duke of Danzig, she has no sooner arrived “than she is an ancestor.” The diagram here shown is compiled upon a very moderate estimate, and based upon some original studies made in Maritzburg upon the reproduction of the peach aphis. It shows in the simplest manner possible that twenty-six days after its birth a single peach aphis, with still another week or ten days’ life before it, has no less than 3,192,085 descendants. An American investigator has shown that, in the case of the woolly aphis of the apple there are twelve generations produced in four and a half months. In our warmer climate it is quite reasonable to suppose that there is an even greater number of generations in the season, but allowing twelve generations only, and estimating the increase each time as a hundredfold, which, I may state, is well within the possible number, the twelfth generation from a single agamic female would amount to a million million million millions. Allowing each individual a sixteenth of an inch square, this would suffice for a layer five deep over the entire land and water surface of the earth. There is, of course, no necessity for me to point out the utter absurdity of imagining that a millionth part of such an increase would occur, but the computation assists one in realising how it is that a tree can so quickly become badly infested, and with figures such as these before us we may almost pardon the man who claims that spontaneous generation is the one and only explanation of the phenomenon. Unfavourable climatic conditions come to our aid, and to these the aphides are very sensitive fungus parasites, and many insects also destroy them. Chief among these are the ladybirds and surphus fly maggots. The peach aphis in Natal is

subject of the attack of a minute wasp parasite, and it has been very abundant this season in and around Maritzburg. In our illustration are shown the remnants of aphides after the parasite has cut its way out of the empty skeleton, having used it as a cover for its transformations after destroying the soft integument.

It is a common and prevalent belief that ants feed upon scale insects and aphides, a mistaken idea that originates from the frequency with which ants are seen moving amongst them. As a matter of fact, the ants collect the sweet honey dew which the plant lice secrete, and the relation between the two is better described by calling the aphides the milch cattle of the ants. Our illustration shows this association, and the milking process will be observed, the ant tickling with its antennae the cornicles of the aphid, so as to stimulate the secretion. In some cases this secretion is so copious that it collects in a film upon the upper surfaces of the leaves, and then forms a nidus in which a black fungus grows, the most conspicuous and well-known case being that of the soft scale of the orange. There is no doubt that ants appreciate the value of aphides to them, for during the adverse periods of the year they look after them. The corn aphid, for instance, is carried down into the warm nests of the ants to pass the cold winter through, and replaced on the plants in the spring. With us, too, the peach aphid is covered over by the ants with a little house of triturated matter, such as that now shown. These ant cowbyres are at times very perfect: there is only one small entrance for the ants, and this is guarded. Apart from this active and interested protection, it is very probable that the ants crawling amongst the aphids also passively protect them by frightening off the parasites.

The last division of the great bug family comprises the mealie bugs and scale insects. These are our most insidious pests, and, as such, worthy of a lecture all to themselves. I shall, therefore, not do more than make this passing reference to them.

We now come to the popular order of butterflies and moths, illustrating my remarks by a series of pictures showing the development and vicissitudes in the life of the lucerne butterfly and the life-cycle of the silkworm. Here are several cases of protective mimicry, and several conspicuous pests, the maize stalk borer, cutworm, and codling moth, all of which belong to this order.

DIPTERA.

Leaving the Lepidoptera, we pass to the order of two-winged insects, the true flies (Diptera). Flies play many parts, some most wicked indeed. As parasites on destructive insects a number are distinctly beneficial. Others aid in the pollenisation of flowers, and many are

scavengers, consuming both animal and vegetable decaying matter. Many also are tiresome and noxious; others destructive to fruits and vegetables.

The fruit fly, now shown in its various stages, is one of the most destructive pests to fruit in South Africa, and for a long time its practical control seemed impossible. Whilst its habit of feeding upon the honey dew secreted by aphides was observed some ten years ago, and its partiality for sweet fluids long known, it is only recently that the proper method of disposing poisoned bait to destroy the adult flies has been discovered and proved most efficacious. It may now be said with a good deal of confidence that anyone who will properly and thoroughly carry out baiting with arsenate of lead and sugar as prescribed will be very well rewarded.

Most pernicious of all flies is the enteric or typhoid fly, more generally known as the house fly. This insect breeds in a variety of moist debris and general refuse, but chiefly in horse dung. The rate of reproduction is very rapid, not only on account of the number of eggs laid, but also because that from egg to adult only occupies the remarkably short period of twelve days. Both in town and country there is little excuse for the prevalence of this filthy pest, and it is extraordinary that our municipal authorities do not engage more actively against it. The enteric fly is a carrier of disease germs, which cling to the numerous hairs upon its feet. Of course, the real reason why the creature is so pestiferous is that it breeds in and frequents all the filthy matter in which these germs abound, and then visits dining-room, kitchen, and pantry at meal hours, crawling over everything, and often coming to rest in the milk.

Among stock pests we have the stomach rot of the horse, and the sheep gadfly, a relation to the fly which attacks wildebeestes in a similar manner. Mention must also be made of the tsetse fly, nor must its first cousin, the notorious carrier of sleeping-sickness, be overlooked. Equally noxious flies are the mosquitoes, some of which act as the intermediary hosts of diseases like malaria. Everyone will be familiar with the life-cycle and development of mosquitoes, which is now portrayed upon the screen.

Insects and ticks act as agents in transmitting diseases of animals in two different ways. The house fly simply carries the germs, and they fall from it on to foodstuffs, and so, in a sense, it is a passive agent. There are several other illustrations of this nature to be found, of which mention may be made of ophthalmia. In these cases the diseases are due to those vegetable organisms known as bacteria. The other group of diseases, such as malaria, malignant jaundice of the dog, East Coast Fever, heart-water of sheep and goats, ngana, sleeping-

sickness, yellow fever, etc., are due to animal organisms which, undergoing a partial development in one animal, cannot complete that development without being transmitted to another animal. Thus the organism of East Coast Fever is equally a parasite of certain ticks and bovines, that of redwater a parasite of the common blue tick and bovines, that of malignant jaundice of the dog tick and the dog, whilst that of malaria is a parasite of certain anopheles mosquitoes and man. What has to be appreciated in these cases is that the organism must undergo certain changes or development in one host before it can, when transmitted to the other, continue its development. Thus in the case of malaria the organism develops up to a stage which, if imbibed with the blood by a mosquito, becomes a parasite of the insect. It is, therefore, possible for a mosquito to feed upon a person with malaria without acquiring the parasites—that is, it may imbibe numerous immature organisms, and these are digested with the blood. If, however, the parasite has acquired the crescent form, then upon reaching the stomach of the mosquito its development proceeds, and it becomes a parasite in the wall of the insect's stomach. This parasite produces numerous progeny, which pass into the salivary glands of the mosquito, and from thence to the blood of man, should the mosquito again feed upon one. In this order fleas also find a place, and it is to be remembered that it is to one of these that we are indebted for the transmission of the bubonic plague.

Poultry Notes.

Use sifted ashes for floor of fowlhouse.

Do not keep more hens than you have room for.

Pick up all feathers during the moulting season.

The profitable hen has a dry, well-ventilated, clean house.

Beware of feeding turnip-tops to the hens; they will spoil the eggs.

No one grain will keep fowls in condition; they must have a variety.

To in-breeding, or, rather, to careless breeding, deterioration is mainly due.

A lump of rock brimstone in the drinking water will keep the birds in good tone.

Coal ashes thrown about the poultry-house are sure death to the blood-sucking mites.

All farmers having young turkeys and goslings should now get them on the stubbles.

Soft-shell eggs mean too fat hens. Give less grain and more vegetables and green food.

Do not stuff your hens, thinking that you can make them lay. Throw feed in the litter and make them work for their meals.

Notes and Notions.

"The world is so full of a number of things."

CRITICISM.—There is a whispered criticism that Nature-study is only about manure. Far from it, but it *begins* with manure. In this it is one with architecture—the central and supreme art possible to mortals, the very mystery of masonry itself, which has its beginnings in the humblest drudgery, the scavenging of dirt, the disposal of manure, in the anxieties of calculation and the perplexities of plan, in the chaotic heaps of quarry, in the deep and toilsome labour, the uncouth massiveness of the foundations, yet steadily rises to shelter and sacredness of hearth, to gloom of tower and glory of pinnacle, to leap of arch and float of fame.—P. G.

"South African Gardening" is the title of a new paper which will be welcomed by all interested in Nature-study. The first number contains a number of interesting articles by experts in horticulture in the various Provinces, and much information that will be helpful to everyone who knows the difficulties of "making their garden grow." It is published by the Central News Agency, Box 1,033, Johannesburg.

Once upon a time a little boy ran away from his nurse, and lay in a shady place at the very end of the garden near the bush. There were a great many trees there, and the leaves were rustling overhead. After a time he thought he could make out what they were saying, so he shut his eyes that they might not see him (he was a very little boy) and listened.

"No," one was rustling. "you grow close to the stem, so you are sessile, you are, you are, and I am petiolate, because I have a short stalk. Besides, I am ex-stipulate, because I have no appenadges and lanceolate that means sharp like a lance, serrate, sharp-toothed all down the edge, and acuminate feel the point of me! Petiolate, ex-stipulate, lanceolate, serrate, acuminate—that's *me*!

At this the little boy was very much afraid; indeed, he was almost too timid to open his eyes, and might have been lying there yet had he not suddenly remembered the sweetie-cake Longolollo had promised to bake for tea.

NOTES FROM OUR JUNIORS.

ONE day I was in the garden, and I saw something grey in a bush of grenadillas, which I took for a hare. The dog chased it out of the clump of grenadillas, and I saw it was a buck (half-grown). It ran out of the gate to the velt, and the dog caught it and let it go again, as he was a pet dog, and did not want to kill it. The buck made for a neighbour's garden, and the dog caught it again, and the Kafir boys came and took it from the dog, and the owner of the place came and put it in one of his fowl runs. It has got all right, and is eating grass and cabbages, but it still very wild, and rushes against the wire when I go to feed it.—
KEITH ARBUTHNOT, Merchiston.

SPIDERS AND THEIR WAYS.

THIS was the title of a delightful lecture delivered in the Y.M.C.A. Hall, Maritzburg, on the 21st of last month, by the Rev. N. Abraham, of Greytown. The lecture was well illustrated by means of a series of fine lantern pictures, all of which were prepared by the lecturer himself. His Honour the Administrator, who presided, said in his introductory remarks that he hoped Mr. Abraham would be able to spin a web strong enough to hold the attention of his audience, and there was little doubt that the lecturer succeeded in doing this, in spite of the fact that the audience was a very large one.

We are unable to publish the substance of the lecture in the present issue, as we are about to go press, but we hope to be able to do so next month.

Copies of Nature Study Syllabus, approved by the Natal Education Department, may be had on application to W. H. Bennett, Esq., Secretary of Education.

* * * *Correspondence, whether in the form of notes, comments, or inquiries, is invited from readers, and letters of general interest will be published and replied to in these pages. All communications should be addressed to "ARATOR," C.O. Editor, "Natal Agricultural Journal," Maritzburg.*

Meteorological Returns.*Meteorological Observations taken at the Govt. Stations for the Month of Oct., 1910*

STATIONS	TEMPERATURE (Fahr. Deg.)				RAINFALL (In Inches)						
	Means for Month		Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day.		Total for Year from July 1 1910	Total for same period from July 1 1909	
	Maximum	Minimum					Fall	Day			
Observatory ..	74.9	60.9	81	53	4.39	18	1.21	18th	9.27	10.24	
Stanger ..	79.9	64.4	92	52	3.60	10	.82	23rd	6.55	11.62	
Verulam ..	76.4	60.5	91	53	4.29	15	.80	24th	8.49	8.86	
Umbogintwini ..	75.4	59.6	85	51	4.20	18	.95	26th	10.88	12.00	
Winkle Spruit ..	74.1	58.7	84	44	4.06	13	1.22	25th	9.94	11.16	
Umzimto ..	81.9	53.5	87	50	4.53	12	1.07	25th	11.30	11.48	
Mid-Illovo ..	69.0	52.9	80	43	4.77	21	1.20	26th	10.37	9.78	
Bulwer ..	64.9	46.5	83	35	5.42	21	0.8	28th	9.07	—	
Richmond ..	70.9	51.4	92	40	6.12	17	1.13	25th	12.82	10.93	
Krantzkloof ..	70.8	57.4	84	46	6.35	20	1.39	27th	11.44	10.28	
P.M.B., N.G. Asylum ..	74.4	53.3	94	42	3.44	16	.82	17th	8.24	6.56	
Howick ..	73.3	50.0	91	39	4.41	15	.83	17th	9.11	5.67	
New Hanover ..	77.2	53.9	95	40	4.05	17	1.05	17th	8.37	6.11	
Krantzkop ..	70.9	57.0	90	51	4.51	14	1.06	17th	8.06	4.89	
Greytown ..	76.0	51.5	92	40	5.26	17	1.34	17th	9.86	6.34	
Lidgerton ..	75.3	35.7	91	30	4.64	17	.99	17th	9.78	6.05	
Nottingham Road ..	70.8	43.9	89	35	3.96	18	.73	17th	8.28	3.30	
Ladysmith ..	80.7	53.7	98	42	6.00	17	2.28	17th	7.41	3.78	
Nqutu ..	88.2	49.5	93	43	4.23	9	1.20	28th	—	—	
Dundee ..	80.3	51.4	91	43	5.22	8	1.33	24th	7.19	5.84	
Newcastle ..	80.2	37.4	94	27	5.37	11	1.50	28th	6.79	4.96	
Charlestown ..	70.8	48.5	85	34	7.24	14	1.72	23rd	9.33	4.46	
Utrecht ..	86.1	50.5	91	38	4.09	10	1.12	22nd	—	3.07	
Vryheid ..	68.5	51.6	95	37	4.88	14	1.15	24th	7.80	5.20	
Paulpietersburg ..	79.9	51.4	89	45	3.88	15	1.14	23rd	6.77	—	
Ngomi Forest ..	67.3	49.9	84	42	8.79	27	1.15	24th	17.39	12.06	
Ubonbo ..	75.9	53.9	88	50	9.62	10	2.90	24th	14.16	8.44	
Nongoma ..	74.9	53.3	85	45	5.38	15	1.5	25th	8.32	5.75	
Ilabisa ..	76.0	56.6	88	5.1	8.63	14	3.20	26th	13.9.9	10.12	
Mahlabatini ..	77.7	40.7	91	35	4.60	14	1.03	24th	8.13	6.14	
Empangeni ..	82.1	61.8	90	50	7.23	12	2.89	25th	12.86	13.78	
Mtunzini ..	84.9	53.4	90	50	5.75	11	1.70	25th	17.58	22.83	
Eshowe ..	77.1	46.2	95	38	3.97	10	1.05	27th	—	—	
Rainfall Stations— Point ..	—	—	—	—	5.17	17	1.03	24th	12.72	12.31	

Meteorological Observations taken at Private Stations for the Month of Oct., 1910.

STATIONS	TEMPERATURE (In Fahr. Degs.)		RAINFALL (In Inches)						
	Maximum for Month	Minimum for Month	Total for Month	No. of Days	Heaviest rainfall in 1 day		Total for Year from July 1, 1910	Total for same period from July 1, 1909	
					Fall	Day			
Maritzburg, Botanical Gardens	94	39	3.20	18	.79	17th	7.73	6.93	
Ottawa	—	—	4.77	12	1.07	25th	9.86	10.05	
Mount Edgecombe	—	—	4.71	13	.74	17th	9.53	11.71	
Cornubia	—	—	5.03	—	—	—	11.2	12.12	
Milkwood Kraal	—	—	4.75	—	—	—	8.98	8.00	
Blackburn	—	—	4.29	—	—	—	8.68	10.52	
Saccarine	—	—	4.52	—	—	—	11.2	10.29	
Umzimto, Beneva	—	—	4.66	17	1.14	25th	10.24	8.73	
Riet Vlei	—	—	4.12	13	1.03	18th	6.95	3.19	
Cedara—Hill Station	88	39	4.74	18	.88	27th	9.18	3.82	
Cedara—Vlei Station	91	34	4.55	19	0.83	27th	9.05	—	
Winkel Spruit	84	44	4.06	13	1.22	25th	9.88	11.16	
Weenen	97.5	42	6.41	12	2.00	17th	32.97	2.76	
Giant's Castle	66.4	45.3	4.93	16	.30	15th	7.67	5.36	
Umhlangeni	—	—	—	14	2.58	26th	—	—	

Coal and Labour Return.

Return of Coal Raised and Labour Employed at the Natal Collieries for the month of October, 1910:—

COLLIERY	Average Labour Employed					Output Tons Cwt.
	Productive Work			Un-productive Work *	Total	
	Above Ground	Below Ground	Total			
Natal Navigation ..	376	728	1,104	8	1,112	28,383 1
Durban Navigation ..	244	773	1,017	8	1,025	22,227 —
Elandslaagte ..	200	080	989	29	1,018	20,231 15
Glencoe (Natal) ..	162	478	640	29	669	16,754 8
Natal Cambrian ..	188	467	655	27	682	13,788 10
St. George's ..	227	397	624	8	632	13,304 —
South African ..	188	428	616	15	631	12,213 7
Hlobane ..	141	325	466	52	518	10,350 2
Burnside ..	261	299	560	41	601	9,042 9
Dundee ..	237	398	635	—	635	7,382 14
Hatting Spruit ..	116	295	411	4	415	7,317 7
Newcastle ..	76	308	384	11	395	6,493 —
Natal Steam ..	75	197	272	5	277	5,348 12
Ramsay ..	80	154	234	—	234	4,651 18
Utrecht ..	46	46	92	187	279	3,122 6
Talana ..	67	94	161	—	161	2,851 13
Ballengeich ..	79	85	164	16	180	1,874 17
West Lennoxton ..	52	73	125	—	125	1,687 6
Dewar's Anthracite ..	17	17	34	7	41	260 —
Mookiapt ..	—	—	—	—	—	249 2
Vryheid ..	5	3	6	—	6	15 —
Totals ..	2,944	6,254	9,198	447	9,645	186,588 7
Corresponding Month, '09	2,561	5,306	7,867	543	8,410	151,044 —

	Productive Work			Un-productive Work	Total, Aug., 1910	Total, Aug., 1909
	Above Ground	Below Ground	Total			
Europeans ..	341	304	445	53	498	439
Natives ..	1,038	4,007	5,045	319	5,364	4,456
Indians ..	1,665	2,043	3,708	75	3,783	3,516

* Cost charged to Capital Account.

† Includes September return.

Mines Department, Pietermaritzburg.
7th November, 1910.

U. P. SWINBURNE,
Acting Inspector of Mines, Natal.

RETURN OF COAL BUNKERED AND EXPORTED.

Return of Coal Bunkered and Exported from the Port of Durban for the month of October, 1910:—

				Tons. Cwt.
Bunker Coal ..	..	..	..	93,867 19
Coal Exported. ..	..	..	..	32,584 13
Total ..	..	..	..	126,452 12

Customs House, Port Natal.
1st November, 1910.

A. D. C. AGNEW,
for Collector of Customs, Natal.

Return of Farms at Present under Licence for Lung-sickness and Scab.

STOCK INSPECTOR.	DISTRICT.	DISEASE.	OWNER.	FARM.
A. P. Crow ..	Ladysmith ..	Scab	Natives ..	Roosboom
		"	" ..	Rooipoort
		"	H. Nicholson ..	Ne herton
		"	Natives ..	Diefontein
		"	" ..	Elandsbaagte
		"	B. J. Neinaber ..	Tylden
		"	D. A. Henry ..	Envogel Vlei
A. P. Crow and Murdoch ..	Ladysmith ..	"	P. Grant ..	Town Land
		"	H. W. Nel ..	Livest Home
		"	H. Fritchley ..	Avonford
		"	Natives ..	Davel's Hoek
		"	" ..	Fourie's Kraal
		"	" ..	Mattwana's Kop
		"	" ..	Gevonden
		"	W. M. J. Bnys ..	Ruit Kull
		"	T. Allison ..	Jacob's Ladder
		"	N Meyer ..	Klipport
		"	C. Covestry ..	Fraughton
		"	G. I. Perry ..	Glaston Bag
		"	J. Bruscott ..	Elands Spruit
A. B. Koe ..	Portion of Estcourt	"	C. Hattling ..	Doornkop
		"	G. Spearman ..	Woodlands
		"	P. van der Merwe ..	Vaalbank
		"	W. Pretorius ..	Mount Alice
		"	Natives ..	ama
A. C. Williams ..	Utrecht ..	"	" ..	Sparkispruit
		"	" ..	Goedehoop
		"	O. J. Meyer ..	Spitzkop
		"	D. M. M. Pfaff ..	We terseden
		"	Natives ..	Gumtree Gravel
		"	" ..	"
		"	" ..	Goede Hoop
L. T. Trenor ..	Alfred ..	Lungsickness	J. T. Clothier ..	Whitecliff
		"	R. Fynn ..	Hughende
		"	Natives ..	Location No. 2
		"	" ..	No. 6
		Scab	" ..	Mt. Helio
		"	" ..	"
R. Wingfield Stratford and Havemann ..	Newcastle ..	"	Natives ..	Location No. 2
		"	W. Osborn ..	Roo point
		"	G. M. rails ..	Kon ngaberg
		"	Unknown ..	Nor mandien Pound
		"	C. G. H. Laas ..	Redcliffe
		"	Natives ..	No mandien
		"	H. J. Hearn ..	Blackmore
		"	J. V. Wade ..	Macleasfield
		"	D. N. van Rooyen ..	Les Kop
		"	Natives ..	Jubilee
		"	E. Saunders ..	Horse hoe
		"	O. Plutz ..	Ganderland
		"	R. S. Miller ..	Colagh
		"	A. ourle ..	Majuba North
		"	A. Vanderplank ..	Eaglescliff
		"	F. Meyer ..	Shepherd's Bush
		"	A. J. van Wyk ..	Genton
		"	M. Collyer ..	Tatham's Camp
		"	A. M. van Niekerk ..	spitzkop No. 5
		"	J. A. C. Morris ..	Erin
		"	M. G. Adendorff ..	Kendal
		"	C. J. de Villiers ..	Waterford
		"	F. Meyer ..	Lo Kip
		"	C. Hodson ..	Garden Villa
		"	B. J. Whings ..	Leicester
		"	F. J. Oosthuysen ..	River Bank
		"	A. M. Cronje ..	Vlatalaagte
		"	Dr. A. J. Abraham ..	Surra
		"	H. J. & W. Yuteman ..	Fountain Dale
		"	A. J. Uys ..	Blaaubosch
		"	" ..	O e Tree
		"	" ..	Fountain Dale

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
G. Daniell	Vryheid	Scab	Natives	Trado
			D. Swart	Alocson
			W. Landman	Drich
			Natives	Toeds
			F. Symmons	Hartebeestbult
			Natives	Berlin
			C. Van Rooyen	Noottegegen
			Native	"
			J. H. Gunter	"
			Nel Bros.	Velgenoege
			Natives	Dubbelrecht
			J. Radford	"
			L. Kanya	Welgelegen
			Natives	"
			D. De Bruin	Rodepoort
			Natives	Meizelfontein
			J. H. Erland	Gondrij
			T. W. Dukes	Grootgewacht
			R. O. van Rooyen	Braamsluit
			Native	Welgelegen
			H. Harting	Prosperity
			L. Bezuidenhout	Nootteverwacht
			Native	Dubbelrecht
J. R. Cooper	Nkandhla & Ngutu		"	Overshot
			B. J. Human	Een genevont
			Natives	Telex Hill
			Petrus Mate	Itela Hill
			Natives	"
			"	Insuzi
			"	Sandwana
			"	Siyongo
			H. Fry	Empandhile
			Natives	Ngutu Town Lands
			"	Macelo
			"	lood River
			"	Mkonjane
			"	Selutshana
			"	Magabeni
E. Varty	Western Umvoti		"	Ngutu Fort
			"	Nondweni
			"	Blod River
E. Mayne	Eastern Umvoti & Krantzkop		"	atahi
			"	Telex Hill
			"	Ngutu Town Lands
A. H. Ball	Weenen		F. H. Nel	Vermak's Kraal
			C. A. Charlewood	Calgieburn
			J. P. S. van Rooyen	Thomview
			Natives	Rigina
			"	Ematimatolo
			"	Veltevred
			"	Groenkop
			"	Ungelegen
			"	Doornkloof
			P. P. van Rooyen	Bellevue
			L. J. van Rooyen	"
			T. J. van Rooyen	"
			Native	Zypherfontein
			W. W. Harding	Milletun
			M. Lotter	Watefall
			P. H. van Rooyen	Buffalo Hoek
			A. Jansen	Sheepridge
			L. Badenhorst	Klipfontein
			A. J. G. Meyer	Doornkop
			Native	Ontbened
			"	Moy
			"	Dumain
			"	Waterial
			"	Dundee Pound
			Unknown	Toversmarus
			P. J. C. Liversage	Rietfontein
			P. J. Swart	Rietfontein
			M. J. Herbst	Klipdij
			C. J. van Rooyen	Berveld
			Natives	Rietfontein
			"	Klip River
			"	Smalldel
			"	"

RETURN OF FARMS UNDER LICENCE.—(Continued).

STOCK INSPECTOR	DISTRICT	DISEASE	OWNER	FARM
E. W. Larkan ..	Umzinga ..	Scab	Natie ..	Gordon M moria
		"	" ..	Jobskop
K. Ripley ..	Emtonjaneni ..	"	" ..	Vermaak's Kraal
		"	" ..	Kwamagwaza
C. E. Walker ..	Portion of Estcourt	"	" ..	Koningsberg
		"	Wm. McFie ..	Highlands
		"	" ..	Lowlands
		"	" ..	N ekerksfonte n
		"	S. F. Boshoff ..	Stanger's Hoek
		"	S. B. .. oollatt	Beacon Hil
		"	H. J. K. Miller ..	Malan Spruit
A. Hair ..	City and Umgeni ..	"	S. C. Marais ..	Bishopstowe
		"	Native	Golf Links
		"	Govt. Bact.	Zwaartkop Location
		"	Natives	A tona
J. Radford (acting)	Pan'pietersburg ..	"	H. Rohrs ..	Rocky Glen
K. W. Bowles ..	Ixopo ..	"	C. J. Webb ..	Glenmaize
		"	W. Whitelaw ..	McKenzie
		"	Natives	eanline
J. W. Stewart ..	Bergville ..	"	F. Zuckel ..	Zuur Plaats
		"	Moeder & Sons ..	Roodebult
		"	D. D. Newton ..	Hamilton
E. J. B. Hosking ..	Richmond ..	"	A. Wright ..	Onvergenoe
H. van Rooyen ..	Babunango ..	"	Natives	

Division of Agriculture Notices.

FEES FOR AGRICULTURAL ANALYSIS.

It is hereby notified that Farmers and others can secure analytical determinations from the Government Laboratory, Central Experimental Farm, Cedara, in accordance with the following scale of fees, which is subject to revision :—

Scale of Fees, which is subject to revision :—							Scale I.	Scale II.
							£ s. d.	£ s. d.
MINERALS TESTED FOR PHOSPHATE :								
Qualitative	...	...	...	...	...	...	0 7 6	0 5 0
Quantitative	...	...	...	...	...	...	0 10 6	0 7 6
Complete	...	...	...	...	...	...	1 1 0	0 15 0
FERTILISERS AND FEEDING STUFFS :								
Determination of 1 constituent	...	...	...	...	...	...	0 7 6	0 5 0
Determination of 2 or 3 constituents	...	...	...	...	...	...	0 15 0	0 10 0
Complete analysis	...	...	...	...	...	...	1 1 0	0 15 0
SOILS : Partial analysis of a soil in relation to its fertility							1 1 0	0 10 6
Complete analysis of a soil	...	...	...	...	...	...	2 2 0	1 1 0
Complete analysis of a soil, with mechanical analysis	...	...	...	...	...	...	3 3 0	2 2 0
WATER : Irrigation and drainage							1 10 0	0 10 6
VEGETABLE PRODUCE : Fodder, Ensilage, Grain, &c.							1 10 0	0 15 0
MILK, CREAM, BUTTER : Fat only							0 5 0	0 2 6
"	"	"	Complete	...	...	...	0 15 0	0 7 6
WATTLE BARK AND TEA : Tannin							0 5 0	0 2 6
CATTLE DIPs : Qualitative analysis of 1 to 3 principle constituents							0 10 0	0 5 0
Quantitative analysis of 1 to 3 principal constituents							1 1 0	0 10 6
INSECTICIDES :								
Qualitative analysis each constituent							0 5 0	0 2 6
Quantitative " " "							0 10 0	0 5 0

Scale No. 1 is applicable to samples handed in by merchants and Dealers, and where trade interests are involved.

Scale No. 2 is applicable to samples forwarded by *bona fide* Farmers and Gardeners.

All fees are payable in advance.

Samples will be accepted at the discretion of the Director, and must be properly selected and labelled.

The Department reserves the right to publish the results of any analysis performed by it; and, where such is deemed of sufficient public interest, it will remain at the discretion of the Director to remit any charges hereunder.

All samples must be addressed to the Chemist, Central Experimental Farm, Cedara.

TREES FOR SALE.

To encourage tree-planting, transplants and seeds of forest trees are supplied by Government, so far as in stock, at the undermentioned rates, exclusive of carriage, from the Government Nursery, Central Experimental Farm, Cedara.

Transplants of Eucalyptus, Pines, Acacias, Casaurinas, Cupressus, etc., about 25 trees in each tin, at 8s. 4d. per 100 trees. Trees in separate tins at 1s. each.

Transplants of scarce kinds, larger trees, or surplus stock, when available, will be charged at special rates, which will be furnished on application.

Tree seeds, in variety, at 6d. per packet. Price per pound, which fluctuates, will be furnished on application.

Package and postage of seed, when required, charged 1s. per lb. extra.

Orders cannot be accepted for a smaller number than 100 trees.

PURCHASE OF TREE SEEDS.

With a view to the encouragement of seed production in the Colony, offers are invited from persons having locally-grown seed of exotic trees for Sale. Not less than one pound will be purchased; and a specimen bearing seed vessels or flowers should be sent for identification purposes.

SILVER POPLAR.

Root suckers of the Silver Poplar (*Populus alba*) can be supplied in any quantity, at 8s. 4d. per hundred, on application.

PERSIAN SHEEP.

An imported Woollen Persian Ram may be hired for the season at a fee of £5, at hirer's risk. Particulars on application. Orders for Haired Persian Rams will be booked for future delivery.

WOOLLED SHEEP.

Offers are invited for young imported Rams being Rambouillet Merinos, Lincolns, Hampshires, Shropshires. Inspection can be arranged to suit intending purchasers.

CORRESPONDENCE.

Communications relating to the following subjects should be addressed in the first place to the officers responsible:—

Admittance of Students to the School of Agriculture.—House Master, Cedara.

Analyses of Soils, Fertilisers, etc.—Analyst, Cedara.

Felling Licenses, Purchase of Timber Sections and Squatters' Holding in Crown Forests.—Chief Forest Officer, Ixopo.

Agricultural Seeds, Livestock, etc.—Farm Manager, C.X.F., Cedara.

Tropical Plants, Seeds, etc.—Manager, Government Farm, Winkle Spruit.
 Agricultural Seeds, etc., for Irrigation Farming.—Curator, Govt Station, Weenen.
 Fruit.—Orchardist, Cedara.
 Accounting Business.—Accounting Clerk, Cedara.
 Woolled Sheep, Woolled Classings, &c.—Wool Expert, Cedara.
 Apiculture.—Aviariist, Cedara.

E. R. SAWER,
 Director, Division Agriculture, Cedara.

Government Cold Stores and Abattoirs.

PIETERMARITZBURG.

It is notified for the information of Farmers and others that Government is prepared to receive Cattle at the Government Abattoir, Pietermaritzburg, for Slaughter and Storage, if necessary, upon the following Scale of Rates and Charges, or such of them as may meet the requirements of Cattle owners. It must, however, be understood that owners will be required to make their own arrangements for the sale of the meat of cattle sent in for slaughter, the Government being unable to offer facilities or to accept responsibilities in this regard.

Cattle may also be received for slaughter at the Government Abattoir, Point, Durban, at the charges noted below. As the Government is unable to offer facilities for cold storage at Durban, or for the sale of the meat of cattle sent for slaughter, it must be understood that owners will be required to make their own arrangements in these respects, and the Government is unable to accept responsibility in either regard at Durban.

Charges in respect of Cattle and the Meat of Cattle.		Calves up to one year old.	Cattle over one year old.	
			Rate per single head.	After reaching 100 head in month.
<i>Abattoir.</i>		s. d.	s. d.	s. d.
1. Receiving, per head...	...	0 3	0 6	0 3
2. Killing and Dressing, per head...	...	2 0	3 6	2 9
3. Disinfectants...	...	0 1	0 1	0 1
4. Cleaning Tripes, each...	...	0 6	0 6	0 6
5. " Sets Feet, per set...	...	0 6	0 6	0 6
6. " Calves' Heads, each...	...	0 9	—	—
<i>Bagging Charge</i>				
1. Per Body of Beef...	...	1 3	2 6	1 9
2. Bagging Labour, per body...	...	0 3	0 6	0 3
Hessian, 3d. per yard.				
<i>Special Storage Rates for Chilling up to 72 hours.</i>				
1. Chilling Beef, per body...	...	1 3	2 9	1 9
2. Chilling Offal, per set...	...	0 6	1 0	0 6

A charge of 1s. per head is made in respect of any Sale of Cattle on leg at the Government Abattoir and a similar charge is made in respect of Bodies of Beef or portions thereof.

For further particulars apply to the Manager, Government Cold Stores.
 Department of Agriculture, Maritzburg, 21st December, 1908.

Employment Bureau.

THE Department of Agriculture has received applications from the undermentioned, who are prepared to become assistants or apprentices on farms. The Department will be glad to hear from farmers willing to take young men as assistants, and to place them in correspondence with the various applicants. Communications should be addressed to the office of this *Journal*.

No. 119.—Lady, experienced in dairy work, is desirous of taking charge of a dairy. Has gone through a course of butter and cheese-making, and holds good testimonials from Mr. J. Marshall Douglas, Chairman of the Royal Agricultural Society of England (1906).

No. 126.—Colonial, 35 years of age, desires to obtain a position as overseer or manager of an ostrich farm. Has been for some years with first-class farmers, and had charge of some of the best birds in the Cape Colony. Has a practical knowledge of incubating, rearing of chicks, dosing and general management.

No. 127.—An expert fruit packer of four years' experience in Spain and France, and twenty years Colonial experience, is open to accept an engagement after 25th April next. He is open to accept low wages, with board and lodging, and fare to and from the Cape where he is at present.

No. 131.—Age 20. Was a student at College of Agriculture, Cape Colony, where he gained a diploma. Has also won prizes for butter making at the Rosebank and Port Elizabeth Shows. Has been in the services of the Orangia Creamery Co., Bethlehem, which he left on account of conditions of employment not being suitable to his requirements.

No. 132. Age 37. Has had nine years experience as Assistant and Manager on Tea Estate in Assam, and has a thorough practical knowledge of tea making in all its Departments. Would like to obtain an appointment in a Tea Garden in Natal. Has a knowledge of several Indian languages.

No. 133.—Desires appointment as Farm Manager. Has had a thorough knowledge of growing and packing fruit, also lucerne growing and hay making. Has also had experience in Ostrich and Stock farming.

No. 134. Age 37. Wishes to obtain experience on an Ostrich farm for a year. Would be willing to invest £700 at the end of the term of probation, and on the expiry of a year's partnership would be willing to increase that sum to £1,000.

No. 135.—Age 35. Has a knowledge of poultry and bee-keeping. Total abstainer. Non-smoker. Good references. Is anxious to get on to a farm.

No. 136.—Wishes to secure employment on an Ostrich farm. Very good references.

No. 137.—Understands carpentry and wagon making. Is anxious to secure a position on a farm.

No. 139.—Age 25. Seven years' experience in mixed farming in Springfield District.

No. 141.—A married man seeks employment on a farm, has had much experience with stock. Understands Native language.

No. 142.—Age 36. Tea Planter, twenty years experience, India, Ceylon and Natal. First class references and gold medalist. Expert knowledge of Tea factory engineering, planting, and manufacture—New openings a speciality. Fluent Indian linguist, and capable business man. Wishes to take over complete charge of large Tea concern. Liberal salary expected, and first class work guaranteed. Correspondence invited from Companies or Capitalists.

No. 144.—Desires employment on a farm in any capacity. Is the son of a farmer in Wiltshire, and has been in S.A. since 1900. Has had some experience on farms in this country.

No. 145.—An experienced Natal farmer finds it necessary to leave his farm on account of the near approach of East Coast Fever, and would be glad of a position as manager on an estate or to work one on shares. Has a good knowledge of general agriculture, and of all kinds of live stock, which he was accustomed to handle on Australian Stations.

No. 146.—An experienced stock and agricultural farmer desires position on a farm. Has had 25 years experience of mixed farming. Speaks and writes Dutch and English. Also speaks Zulu, and is accustomed to handling of coolies. Good references.

No. 147.—Desires to obtain a situation as manager or under manager on a farm. Has had a great deal of experience with all kind of farming, stock, mixed, and coast. For the last ten years has been manager of a farm on the Coast, and prior to that he was engaged in farming in the Dundee and Harrismith districts respectively, when he took many prizes for stock on various Agricultural Shows. He has had much experience with machinery also and understands building. Offers first-class references. Can speak, read and write Dutch and can speak Kaffir. Is accustomed to managing Coolies.

No. 148.—Has a fairly good practical knowledge of farming in Ireland, and desires to obtain a situation on a farm in this Country.

149.—Understands farming and is a good Zulu linguist. Desires situation on a farm more especially as manager. Holds a certificate for book-keeping.

No. 151.—Is anxious to obtain a situation on a farm; has not had any experience in farming. Can speak Kafir and understands bookkeeping. Is not afraid of work.

No. 152.—Is anxious to obtain a position on a farm. Has not had any experience in farming. Is a carpenter by trade. Is not afraid to work.

EMPLOYMENT FOR GIRLS.

The Minister of Agriculture has received a letter from the Chairman of the Transvaal Land Settlement Board, stating that he has been asked by several correspondents in England if there are any openings in South Africa, such as in creameries, for girls trained at Bromsgrove Colonial College and other such training centres in England. We should be glad to hear from any institutions or farmers in Natal who may be in a position to offer situations to girls who have been trained at such Colleges, when we shall be pleased to place them in communication with the Chairman of the Transvaal Land Settlement Board.

Farm Apprentices' Bureau.

THE following is a list of the applicants which have so far been received by the Editor of the *Natal Agricultural Journal* from boys desirous of obtaining positions on farms. Farmers wishing to get into communication with any of these applicants should address their enquiries to the office of this journal.

The majority of the applicants have, of course, had no farm experience, but all appear to be strong, healthy and willing.

- | | | | |
|--------|--|--|---------------------------------|
| No. 3. | Age 24. | Colonial born | Has a knowledge of bookkeeping. |
| " 15. | Age 19. | Is desirous of learning farming. | |
| " 25. | Age 23. | Bricklayer by trade. Is anxious to get on a farm. | |
| " 27. | Age 19. | Has had one year's experience on a farm in the Cape Colony. | |
| " 53. | Age 17. | Has had 18 months' experience of farming in Zululand. Speaks Zulu. Understands cattle and horses. | |
| " 56. | Age 20. | Strong, tall and healthy, good rider, fond of stock, and has had some years experience of general farming. Small salary required with board and lodging. | |
| " 57. | Has had two years experience on a farm. Speaks Zulu and has a slight knowledge of Dutch. Is anxious to get on to a farm. | | |

PREMIUM OFFERED.


We have received an application from London in which an applicant expresses his desire to learn farming in Natal, for which he is willing to pay a premium to a first-class farmer who may be willing to take him on to his farm. He has had some training at an Agriculture College in England. We shall be glad to hear from any Natal farmers who may be willing to enter into an agreement with our correspondent for this purpose.

Pound Notices.

NOTIFICATION is contained in the *Provincial Gazette* of the sale, unless previously released, of the undermentioned live stock on the dates specified :—

ON THE 21ST DECEMBER.

Howick (Lion's River)—Cream or dirty white stallion donkey, about 12½ hands, branded on right hip, like J D, and three notches in right ear. Probable value, £7. Impounded on 9th November by James Buchanan, jun., Rama Kop.

Thornville Junction (Umgeni)—Light brown or mouse coloured mule mare, clipped mane and tail, harness marks on shoulders, branded  on near hip.

Land and Agricultural Loan Fund.

The Land and Agricultural Loan Fund has now been established, and the Board are prepared to receive applications for advances on security of first mortgage on fixed property. Applications must be made upon special printed forms, which can be obtained, together with full particulars as to the conditions under which advances are made, from the office of the Fund, Colonial Offices, Pietermaritzburg.

All Correspondence should be addressed to the Secretary, Land and Agricultural Loan Fund, P.O. Box 357, Pietermaritzburg.

Diamond Drilling.

SOME of the departmental diamond drilling plants are at present disengaged and available for hire for boring for either minerals or water. Particulars as to terms of hire may be obtained from the undersigned.

U. P. SWINBURNE,
Acting Inspector of Mines, Natal.

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. . . THE . . .
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Chapter I.

DISEASES AND PESTS.

THE present chapter is the longest of all the chapters into which I have divided the various laws affecting farmers and landowners. In view of its great length, the most convenient method of dealing with the various laws which it comprises will be to take each section of the chapter separately, prefacing the section with a few introductory remarks on the laws contained therein. In the same way, instead of giving a list of the laws at the head of the chapter, as I have done in the other chapters, I will enumerate the laws at the head of each section.

I.—GENERAL.

[LAWS.—Law 29, 1874; Act 36, 1891; Act 3, 1897.]

Provision is made in Act No. 38 of 1894 for preventing the spread of contagious and infectious diseases among animals. This Act refers to all contagious and infectious diseases. Steps are prescribed to be taken in the case of an outbreak of disease, which from considerations of space I do not propose to go into, either in the present case or in those of laws referred to in succeeding sections. Provision is made for the issue of orders by the Governor in Council prohibiting the introduction of stock from other countries in which infectious or contagious diseases exist.

Act No. 3 of 1897 permits the seizure by any constable or guard of any cattle from outside Natal which have passed through any fence that may have been erected for the exclusion of cattle. The same Act prescribes punishment for the crime of wilfully spreading any cattle disease in Natal. Law No. 29 of 1874 deals with the burial of the carcases of dead animals.

ACT NO. 38, 1894.

“For preventing the spread of Contagious and Infectious Diseases among Animals.”

Short Title: “The Animals Diseases Act, 1894.”

3.—*Special Laws not Affected by this Act.*—Nothing in this Act shall be construed to repeal the provisions of any special Law or Act relating to the disease of lung-sickness, glanders, farcy and scab.*

* As amended by Act No. 30, 1899.

4.—*Isolation of Animals.*—Every person who shall have in his possession or under his charge any animal affected with or showing symptoms of cattle plague or rinderpest, foot and mouth disease, or any other contagious or infectious disease, save as is in the third section of this Act excepted, shall immediately isolate such animal, and forthwith give notice of the disease to the owners or occupiers of adjoining properties, and to the Magistrate of the Division, who shall thereupon pass on such notice to the Colonial Secretary.

5.—*Enquiry and Inspection.*—Whenever it shall appear to any Magistrate that there is reason to suspect that any animal in his Division is affected as aforesaid, he shall cause such enquiry and inspection as may be necessary to be made.

6.—*Examination.*—On receiving information that any animal appears to be affected as aforesaid, the Magistrate may cause the suspected animal to be examined at the place of its isolation by a Veterinary Surgeon, and by two landed proprietors in the district, and in the event of there being no Veterinary Surgeon available, then by three landed proprietors in the district.

7.—*Isolation or Destruction.*—Immediately after such examination the Veterinary Surgeon and the said landed proprietors may issue an order for the isolation or destruction of such animal at the place at which the animal is isolated.

8.—*Diseased Animal not to be Removed.*—No animal showing symptoms of any such disease as aforesaid shall be removed from the land on which it is when found in such condition, unless it be found upon a road or thoroughfare, or in a town or village, or on a commonage, outspan, or other public place, in which case it shall be removed by the nearest way to an adjacent place to be isolated or destroyed.

Save as last aforesaid no such animal shall be driven or otherwise conveyed or taken upon any road, railway, or thoroughfare, or unto or across any other land than that on which it was found in such condition.

9.—*Proclamation of Infected Districts.*—Whenever any contagious or infectious disease exists among animals in any district, the Governor in Council may, if it shall seem proper to do so, proclaim any district or place defined in the Proclamation to be an infected area, and may by such Proclamation forbid the removal from or bringing into such area of any of such animals as are named in the Proclamation, whether such animals are or are not affected with any disease: Provided that the Governor in Council may by such Proclamation make such exceptions as may appear expedient in regard to animals not affected with any disease.

10.—*Prohibition of Introduction of Stock from Proclaimed Countries.*—The Governor in Council may, by Proclamation, prohibit the introduction into Natal of any stock from any country in which any of the

diseases mentioned in Clause 4 of this Act are found by the Government to be prevalent.

11.—*Prohibition of Importation of diseased Animals.*—It shall not be lawful to import into Natal by sea or over any inland border any animal suffering from, or showing symptoms of, any infectious or contagious disease, or the carcase or any part of the carcase of an animal which has died from an infectious or contagious disease. The owner, or agent of the owner of an animal imported in contravention of this section shall be deemed guilty of the contravention, if he has accompanied such animal, or shall have been present at the time of importation, or shall have had reason to know that such animal was so diseased; otherwise the person in charge of such diseased animal shall be deemed guilty of the contravention.

12.—*Isolation of Animals.*—The Magistrate is hereby empowered, upon the recommendation of the Colonial Veterinary Surgeon, or other Veterinary Surgeon, or majority of landed proprietors aforesaid, to direct the isolation at such places as he may determine, of any animals which he shall be satisfied have been in contact with an animal affected with a contagious or infectious disease, for such period and under such restrictions as he may deem necessary.

13.—*Destruction of Utensils, etc.*—The Colonial Veterinary Surgeon may by himself or by any Veterinary Surgeon or officer acting under him, give orders for the disinfection or destruction of utensils, clothing, coverings or other articles likely to disseminate disease, and for the purification to his satisfaction of any vehicle, building or place where a diseased animal has been kept.

14.—*Officers.*—The Governor may appoint officers for carrying out this Act, who shall be officers of the department of the Colonial Veterinary Surgeon.

15.—*Regulations.*—The Governor in Council may make regulations for carrying out the purposes of this Act. Such regulations may provide for penalties for contravention thereof, or of this Act, not exceeding in any one case £50 with the alternative of imprisonment, with or without hard labour, until the payment of the fine, such imprisonment, however, not to exceed the term of three months: Provided that no such regulations shall have effect until after promulgation thereof in the *Natal Government Gazette*.

16.—*Compensation.*—If upon examination of the carcase of any animal destroyed under the provisions of this Act, it shall be ascertained that such animal was not suffering from a contagious or infectious disease, the owner shall be entitled to be paid from the Public Revenue the value of such animal immediately before death.

17.—*Assessment of Value.*—In determining the value of an animal which has been imported into Natal, the Court may take notice of the actual cost of the purchase and importation thereof, due regard always being had to any other circumstances which may affect its value.

18.—*Prosecutions.*—Every contravention of this Act or of the Regulations, shall be cognizable, and may be tried in the Court of the Resident Magistrate of the Division in which the contravention occurred, or in which the person accused may be.

LAW No. 29, 1874.

"To remove nuisances from the Public Roads, and to prevent the spread of infectious and contagious diseases amongst cattle."

1.—*Magistrate may authorise the Removal of Carcasses.*—It shall be lawful for the Lieutenant-Governor to authorise any Resident Magistrate or other person to cause the carcasses of any dead animal to be removed from the public road at the public expense.

2.—*Burial of Dead Animals.*—It shall be lawful to bury any dead animal on any farm on which such animal may have died, or on any farm adjoining the road near where such animal may have died: Provided any such animal be not buried in cultivated or enclosed land, nor within five hundred yards of any dwelling-house: Provided also, that such animal shall be buried at least three feet below the surface.

ACT No. 3, 1897.

*"To continue, with amendments, the Cattle Diseases Acts of 1896."**

2.—*Cattle Breaking through Fences may be Seized and Forfeited.*—If any cattle from outside the Colony shall be driven through any fence erected for the exclusion of the cattle from the Colony or shall be allowed to break down or pass through such fence into the Colony, in violation of any prohibition, proclamation, etc., such cattle shall at once, and without any adjudication of forfeiture, become forfeited to and the property of the Government of Natal, and may be seized by any constable or guard or like officer and be destroyed or dealt with as Government may direct.

3.—*Punishment for Wilfully Spreading Cattle Disease.*—If any person shall wilfully introduce, or attempt to introduce, any cattle disease into Natal, or wilfully spread such disease in Natal, he shall be deemed guilty of an offence, and upon conviction in the Supreme Court or a Circuit Court shall be liable to be imprisoned, with or without hard labour, for any term not exceeding five years, and all his property, movable and immovable, shall become forfeited to Her Majesty.

* These Acts (Nos. 1 and 34 of 1896) were continued by the above Act No. 3, 1897, until the 31st December, 1898. They were not continued after this date has have expired.

4.—*Forfeiture of Offender's Property.*—If any such person be beyond the jurisdiction of the Supreme Court of Natal, his property within the Colony may be seized and attached, and he may be sued for the forfeiture thereof.

6.—*Interpretation.*—The word “cattle” in this Act shall include all horned cattle, sheep, goats, swine, horses, asses, dogs and any other animal which may be further included by a Proclamation.

II.—EAST COAST FEVER.

[LAWS. —Act 32, 1903; Act 54, 1906; Act 6, 1907; Act 32, 1908; Act 20, 1910.]

The first Act passed by the Natal Parliament for preventing the spread of East Coast Fever was Act No. 32, 1903. This was amended slightly in 1906 by Act No. 54 of that year. Provision for compulsory fencing was made by an Act (No. 6) passed in 1907; and all these Acts were subjected to slight further amendments and extensions in 1908 by Act No. 32 of that year. Act No. 20 of 1910 authorised loans by Government for the construction of dipping tanks and for the erection of fences extending the provision of the existing East Coast Acts.

ACT No. 32, 1903.

“For preventing the spread of the disease known as Rhodesian Redwater.”
*Short Title: “The East Coast Fever Act, 1903.”**

1.—*Interpretation.*—In this Act the expression “the Minister” means the Minister having charge of the Department of Agriculture. The expression “the disease” means the disease commonly known as Rhodesian Redwater, or East African Coast Fever.

2.—*Quarantine or Destruction of Infected Cattle.*—The Minister shall have power to quarantine or destroy or dip any cattle which may be reported to him to be infected with the disease, or to have mixed or been in contact with infected cattle, or which there are reasonable grounds for believing to have been upon infected land (that is to say, land on which infected cattle have been kept or pastured or over which they may have passed), or in any other way exposed to the risk of contracting the disease, or whenever he considers it necessary to do so in order to prevent the introduction or spread of the disease in the Colony.

3.—[Repealed by Act No. 34, 1906.]

* See Act No. 54, 1906, *post*.

4.—*Minister may Define a Zone from which Cattle shall be Removed.*—The Minister shall have power to define a zone of country along any border of the Colony, or around any infected area, or at any part of the Colony where it may be considered necessary, and to order that all such cattle or other animals as he may direct shall be removed from any such zone, and that no such cattle or other animals shall be allowed to enter or to be in such zone.

5.—*Power of Principal Veterinary Surgeon to Quarantine and order Dipping.*—The Principal Veterinary Surgeon shall have power, subject to the approval of the Minister, which shall be obtained as soon afterwards as conveniently may be, to quarantine any cattle or other animals when he considers it necessary to do so, and to order any cattle or other animals to be dipped or dressed in such way as he may direct for destroying ticks, before allowing them to be removed from a quarantine or an infected area.

6.—*Minister may order Dipping.*—It shall be lawful for the Minister to order that all cattle in the Colony or in any district thereof, and such other animals as he shall determine, shall be dipped or dressed at such time or times and in such manner as he may prescribe for the purpose of destroying ticks.

7.—*Removal and Isolation of Cattle within an Infected Area.*—The Minister shall have power to order the removal of cattle or other animals from one portion to another of an infected area, and to enforce the isolation of cattle or other animals on any specified portion of an infected area: Provided that no cattle shall be removed to or across a farm occupied by clean cattle.

8.—*Prohibition of Removal of Hay, Fodder, etc., out of an Infected Area.*—The Minister shall have power to prohibit the removal from an infected area into any other part of the Colony, or from one place to another within an infected area, of hay or fodder, or of any other thing which he considers likely to convey ticks or cause infection.*

9.—[Repealed by Act No 54, 1906.]

10.—[Repealed by Act No. 54, 1906.]

11.—*Governor in Council may Order Adoption of Particular Method of Inoculation.*—The Governor in Council may, by notice in the *Government Gazette*, order that any method of inoculation or treatment described in such notice shall be adopted for the prevention of the disease.

*Section as amended by Sec. 13, Act 32, 1908.

After the publication of such notice,

- (a) The Principal Veterinary Surgeon, or any District Veterinary Surgeon, may order any cattle to be inoculated or treated according to the method described in the notice, if he shall have reason to believe that they are infected with the disease or have been exposed to the risk of infection, or are likely to spread the disease.
- (b) The Minister may, by notice in the *Government Gazette*, order that all cattle in any area or part of the Colony, shall be inoculated or treated according to the prescribed method.

The Regulations hereinafter provided for may prescribe the mode and conditions of effecting the inoculation or treatment, and in all matters necessary to be observed in connection therewith.

12.—*Enforcement of Orders.*—Any order of the Minister or Principal Veterinary Surgeon may be enforced by an officer of the Veterinary Department, or by any person whom the Minister may appoint for the purpose.

13.—*Failure to Obey Orders.*—The owner of any cattle or of any animal, or the person in whose possession or charge the same may be, shall promptly obey and carry out any order given for the isolation, quarantine, dipping, dressing or removal thereof, or any other lawful order made under this Act or the regulations. If he shall fail or neglect to do so, the District Veterinary Surgeon, or other officer, may carry out the order at the cost of the owner or such other person as aforesaid, who shall not thereby be relieved of any liability to punishment as hereinafter provided; and such cost shall be recoverable in the Court of the Magistrate of the Division in which the order shall have been so carried out, or in the Supreme Court of the Colony.

14.—*Duration of Quarantine.*—Quarantine or isolation of cattle or other animals under this Act shall continue for such time as shall be prescribed by the Minister or Principal Veterinary Surgeon.

15.—*Construction of Public Dipping Tanks.*—The Minister may construct tanks at public expense in any part of the Colony for dipping cattle or other animals, and may make such charges for dipping as he may see fit, and recover same from the owners of cattle or other animals dipped, or from the persons in charge of the same.

16.—*Regulations.*—The Governor in Council may from time to time make regulations for carrying out the purposes of this Act. Such regulations may, amongst other things, prescribe the mode of quarantine or isolation of cattle or other animals and the means to be used in enforcing the same, and may define the authority and duties of guards and the like.*

*See Sec. 8 of Act 54, 1906, *post*.

17.—*Publication thereof.*—Any regulations made under this Act, and any order declaring an infected area, or defining a zone in terms of Section 4, or ordering compulsory dipping in terms of Section 6, shall be published in the *Government Gazette* as soon thereafter as possible.

18.—*Compensation for Destruction of Healthy Animals.*—If upon the examination of the organs of any animal destroyed under the provisions of Section 2 of this Act it shall be ascertained by the Principal Veterinary Surgeon, or any District Veterinary Surgeon, and certified by the Minister that such animal was not suffering from the disease, the owner shall be entitled to be paid from the public revenue the value of such animal immediately before death: Provided that the payment shall in no case exceed the rates set forth in the Schedule to this Act.

19.—*Compensation for Loss by Creation of Zones.*—In the event of any person suffering any loss or damage in consequence of the creation of a zone in terms of Section 4 hereof, he shall be entitled to be paid from the public revenue the amount thereof: Provided that in the event of any dispute arising between such person and the Government as to the amount of such loss or damage the same shall be referred to a Board consisting of the District Veterinary Surgeon and two landowners, to be elected at a public meeting of landowners called by the Magistrate of the Division, who shall make a report thereon to the Minister, whose decision shall be final.*

20.—*Punishment for Contravention of Act or Regulations.*—Any person who shall contravene this Act or any of the regulations, or who shall disobey any order made thereunder, or who shall neglect to carry out any duty imposed upon him by the Act or the regulations, shall be guilty of an offence, and shall be liable, upon conviction in the Court of a Magistrate, to a fine not exceeding One Hundred Pounds (£100), or to imprisonment, with or without hard labour, and with or without the option of a fine, for any term not exceeding six months.

21.—*Saving of other Laws or Acts.*—Nothing in this Act shall be deemed to repeal or lessen the effect of any other Law or Act relating to diseases of animals.

New Clause.†—The Minister may at any time when he considers it necessary to do so to prevent the spread of the disease, order the removal of cattle from an infected area or from any place adjacent to an infected area, and dispose of them for immediate slaughter: Provided, however, that the owner of any such cattle shall have the alternative of disposing of the whole of the same by private treaty, for slaughter, within one week after notice has been given him in writing. If the owner shall so dispose

* Section as amended by Sec. 9 of Act 54, 1906.

† Added by Act No. 8, 1907.

of such cattle he must conform to all Government requirements, and all rules and regulations which may be in force regarding the removal of cattle. Cattle so taken shall be paid for at the rates specified in the Schedule to this Act.

Schedule.

	£	s.	d.
Yearling oxen or bulls, up to	2	0	0
Yearling heifers, up to	3	0	0
2 year old oxen or bulls, up to	3	0	0
2 year old heifers, up to	4	0	0
3 year old oxen or bulls, up to	4	0	0
3 year old heifers, up to	5	0	0
Cows, 4-8 years, with calves, up to	7	10	0
Cows, 4-8 years, without calves, up to	6	10	0
Oxen, over 4 years, up to	7	0	0
Cows, 8-12 years, with calves, up to	6	0	0
Cows, 8-12 years, without calves, up to	5	0	0
Old cows, with calves, up to	4	0	0
Old cows, without calves, up to	3	0	0
Bulls, 4 years and over, up to	4	0	0

ACT NO. 54, 1906.

"To amend Act No. 32, 1903, entitled 'Act for preventing the spread of the disease known as Rhodesian Redwater.'"

1.—*Construction of Act.*—This Act shall be read and construed with Act No. 32, 1903, as one Act.

The said Act No. 32, 1903, may be known as the East Coast Fever Act, 1903, and is in this Act referred to as the principal Act.

2.—*Repeals.*—Sections 3, 9 and 10 of the principal Act are hereby repealed, without prejudice to anything ordered or done, or any regulation made, or any liability incurred thereunder.

Any reference in this Act, or in the principal Act, to an infected area shall be understood as a reference to an area declared to be an infected area either under this Act or under Section 3 of the principal Act before the repeal thereof.

3.—*Powers in Regard to Infected Areas.*—The Minister shall have power to declare any area to be an infected area within the meaning of this Act, and to prohibit the ingress or egress of cattle or other animals into or from an infected area, to order or prohibit the removal of cattle or other animals from one part to another of an infected area, to enforce

* As amended first by Act No. 54, 1906, and subsequently by Act No. 8, 1907.

the isolation of cattle or other animals on any specified part of an infected area, to fence off any area declared to be infected as aforesaid, and in all respects to control the movement of cattle and animals in, into, from, or over an infected area.

The Minister may also make such orders as may be required for giving effect to the powers conferred by this section.

The Principal Veterinary Surgeon or any District Veterinary Surgeon or Stock Inspector shall have power, pending the instructions of the Minister, to exercise the powers given by this section to the Minister. He shall promptly report any order so made to the Minister, who shall take such action thereon as he may think proper.

The Governor in Council may from time to time make regulations for carrying out the provisions of this Act. Such regulations shall amongst other things make provision for the formation of Committees in the different Magisterial Divisions for the purpose of advising and assisting the Minister in all such matters arising out of this Act and Act No. 32, 1903, as may be submitted to them.*

4.—*Branding of Cattle.*—The Minister shall have power to order any cattle within an infected area to be branded in such manner and with such marks as he may direct.

5.—*Quarantine or Destruction of Cattle.*—The Principal Veterinary Surgeon or any District Veterinary Surgeon may order the destruction or quarantining of any animal which shall have been brought into this Colony in contravention of this Act or of Law No. 13, 1866, or Act No. 38, 1894, or which may stray into, out of, or within an infected area, or which may be removed into, out of, or within an infected area without the written permission of a District Veterinary Surgeon, Stock Inspector, or other person authorised by the Principal Veterinary Surgeon for the purpose, and no person shall be entitled to compensation or payment in respect of any animal which may be so quarantined or destroyed.

6.—*Powers of Landlord in respect of Cattle Trespassing.*—If any cattle not exceeding five in number shall stray into or cross any land within or immediately joining an infected area, the owner or occupier of the land may destroy such cattle unless they are travelling along a public road or right of way and the person in charge of such cattle is in possession of a permit to move the same granted by a District Veterinary Surgeon or Stock Inspector, or any person authorised by the Principal Veterinary Surgeon to give such permits, and the cattle are being moved in accordance with the permit; and he shall not be liable to pay compensation for any cattle so destroyed unless it shall appear to the Court

* Advisory Committee Regulations were published in the *Government Gazette* for June 20, 1908; November 10, 1908; and September 7, 1909.

that they were destroyed recklessly or wantonly, and without reasonable cause.

If the number of cattle so straying on to or crossing the land exceeds five the owner or occupier of the land may secure them and report the case to the District Veterinary Surgeon or Stock Inspector, who may deal with them in manner as provided in Section 5, without any liability for compensation.

In addition to any liability for damages or otherwise the owner and any other person responsible for the cattle which may have so strayed on to or crossed the land shall be liable to pay the expenses of and incidental to the detention and destruction or quarantining of the cattle.

Cattle so taken shall be paid for at the rates respectively set forth in the Schedule of this Act.

7.—*Interference with Fences.*—No person shall, under pain of contravention of this Act, remove or in any way interfere with any fence erected or maintained for any purpose connected with the suppression of the disease, whether such fence be his own property or not, unless he shall have first obtained the written consent of the District Veterinary Surgeon or Stock Inspector.

This section shall apply to any Magisterial Division which may be named in an order made by the Minister and published in the *Natal Government Gazette* declaring such Division to be brought within the operation of this section.

Any such order may be revoked, varied or renewed by the Minister from time to time.

8.—*Regulations under the Principal Act.*—The regulations under Section 16 of the principal Act may, amongst other things, prescribe the conditions under which cattle or other animals may be moved from place to place at any time when it may be considered necessary to regulate their movement in order to prevent the spread of the disease.

9.—*Amendment of Principal Act.*—The words “shall be referred to arbitration” at the end of Section 19 of the principal Act are hereby expunged, and the following substituted therefor: “Shall be referred to a Board consisting of the District Veterinary Surgeon and two landowners, to be elected at a public meeting of landowners called by the Magistrate of the Division, who shall make a report thereon to the Minister, whose decision shall be final.”

10. If any question shall arise whether any regulation made by the Governor in Council, or any order made or act done by the Minister is within the powers conferred by this Act or by the principal Act, or as to the lawfulness or authority of any act or order of the Principal Veterinary Surgeon or of an officer of his department, and if a certificate under the hand of the Minister is presented to any Court before which such

question is brought, that in the opinion of the Government there is urgent need in the public interest for such regulation, act or order, the Court shall not have power to make any order restraining or interfering with the enforcement of such regulation or order, or the carrying out of such Act.

Any such question shall be deemed to be brought before a Court if any suit, appeal, or application is made in which the validity or lawfulness of a regulation, order, or act is either directly or indirectly brought into question.

11. The Schedule of the Principal Act is hereby repealed and the Schedule of this Act is substituted therefor, and Section 18 of the Principal Act shall be construed accordingly.*

ACT NO. 6, 1907.

"To provide for the compulsory fencing of lands within the Colony of Natal."

2.—*Erection of Fences.*—(a) For the purpose of preventing the spread of the cattle disease known as East Coast Fever, and notwithstanding anything contained in the Fencing Law, 1887, or the Laws and Acts amending the same, the Minister of Agriculture may, with the approval of the Governor in Council, cause to be erected fences along the boundaries of any farms within an infected or suspected area or of any native location or of any town lands within such area.

(b) The term "fence" in this Act shall mean a fence approved by the Minister of Agriculture.

3.—*Cost of Erection and Recovery.*—(1) The cost of erecting any fence along the boundaries of any farm shall be in the first instance defrayed out of moneys voted by Parliament. Such cost shall be repaid, together with interest thereon at the rate of five per centum per annum, by thirteen yearly instalments, the first payable two years after the fence is completed. Such instalments shall be calculated and fixed so that the said cost with interest thereon shall be wholly repaid within a period of thirteen years from the date on which the first instalment falls due.

(2) Such repayments of cost and interest shall be made by the owner of any farm fenced under the last preceding section or if the fence divides the farms of adjoining owners then each such owner shall pay one-half the cost of the part of the fence dividing such farms together with the interest aforesaid.

* The amended Schedule referred to in this Section was itself repealed by Act No. 8, 1906, and a fresh Schedule substituted. From considerations of space this later Schedule is not printed here, but will be found at the end of Act No. 32, 1903 *ante*, as well as, of course, in conjunction with Act No. 8, 1906.

(3) The term "*owner*" in this and the following sections shall mean the person registered as the owner in the office of the Registrar of Deeds, and the term "*farm*" shall include any portion of a farm.

(4) Should any farm or area be bounded by any river bank, donga or spruit, the Minister of Agriculture shall have the power to erect the fence along some more convenient line. In such event the cost of the fence shall be borne solely by Government, who shall have the right to dispose of or remove the same when desirable.

(5) Where the adjoining land is Crown land or held by the Natal Native Trust, the Government, or the Natal Native Trust, as the case may be, shall bear one-half of the cost of the fence.

4.—*Cost to be a Lien on the Property Fenced.*—The Minister of Agriculture shall notify in writing to the Registrar of Deeds the amount due by any owner under this Act, and the Registrar of Deeds shall upon receipt of such notification note the said amount in the Land Register and shall deliver to the Minister of Agriculture a certificate setting forth such amount and the date of the note. The cost of such fencing shall be a first charge and lien in favour of the Government upon the lands so fenced, and such lien shall have priority over any existing mortgage thereon. An entry shall be made by the Registrar of Deeds in the Public Debt Register of the particulars of such debt due to the Government, and of the lien upon the land.

5.—*Additional Rent Charge in case of Leases.*—Where any such farm aforesaid held under lease has been enclosed by a fence erected under this Act during the term of the lease, the lessors shall be entitled to receive from the lessee as from date when such farm became so enclosed a payment of five per cent. per annum on any sum he may have paid to the Minister of Agriculture under Section 3, and such payment shall be made with the rent of the farm and shall be deemed in law to be part of such rent.

6.—*Municipal Corporations and Local Boards.*—Whenever the Minister of Agriculture shall have incurred any cost in respect of the fencing under this Act in respect of any town lands which may have become vested in the Corporation of any Borough or the Local Board of any Township, the cost shall be repayable by such Corporation or Local Board in the manner provided by Sub-section 1 of Section 3 of this Act.

7. *Contributions of Material and Labour a Set-Off.*—Nothing in the foregoing sections shall be deemed to prevent any person liable for the cost of the erection of a fence under this Act from contributing approved material or labour or transport towards the cost of such fence, and any such contribution shall be set off against the amounts mentioned in the said sections respectively according to a value to be determined in the absence of agreement by the Magistrate of the district.

8.—*Fencing Roads, Boundaries, etc.*—The Minister of Agriculture may cause to be fenced (1) Any roads, whether public or private, traversing any part of the Colony; (2) Any boundaries of the Colony or outspan in the Colony; and the cost of any fence erected under the powers of this section may be defrayed entirely out of the moneys voted by Parliament for the purposes of this Act.

9.—*Act to be Construed with Fencing Law.*—This Act shall be read and construed in conjunction with the provisions of the Fencing Law of 1887 and the amending Acts so far as the same may be applicable thereto; and the Minister of Agriculture shall have power to direct owners to properly maintain and keep in good repair any fences; and, failing their compliance, he may carry out such repair at the owner's cost, subject to the provisions of Section 3 of this Act. No person shall remove or in any way interfere with any fence erected or maintained under authority of this Act.

10.—*Regulations.*—The Governor in Council may from time to time make regulations, and any person who shall contravene such shall, upon conviction in the Court of a Magistrate, be liable to a fine not exceeding Ten Pounds (£10), or in default to imprisonment with or without hard labour for a period not exceeding one month.

11.—*Punishments.*—Any person who shall contravene Section 9 of this Act shall, upon conviction in the Court of a Magistrate, be liable to a fine not exceeding Twenty-five Pounds (£25), or to imprisonment with or without hard labour for any period not exceeding six months.

ACT No 32, 1908.

"To amend the East Coast Fever Acts."

1.—*Powers of Committees to Order Erection of Gates and Fences.*—Any committee appointed in pursuance of the regulations under Section 3 of Act No. 54, 1906, shall, whenever they consider it necessary, in order to prevent the spread of East Coast Fever, have full power within the district for which such committee is appointed:

- (a) To require any person to erect one half of such boundary fences on his farm or land as they may direct and to keep the same in good order and repair*:

The fences shall be of such kind and standard as the committee may prescribe, but not of a more expensive character than those required by the Fencing Laws Nos. 30 and 36, 1887;

* Sub-section as amended by Sec. 6 of Act No. 20, 1910.

- (b) To authorise or to require any person to erect gates across any main or public road or any by-road and to maintain them in good repair;

The gates shall be of such kind as the committee may direct: Provided that any gates which the committee may under their compulsory powers order to be erected shall be in keeping with the character of the fences which the committees are by this Act authorised to require.

Any order signed by the chairman or secretary of a committee shall be sufficient proof that the same has been made by the committee.

The word "committee" wherever used in this Act shall include sub-committees.

2.—*Gates on Main Roads.*—Gates erected across main roads shall be swing gates not less than fourteen feet wide; such gates shall have a balance catch or other free fastener, and shall be of such construction as the committee shall determine.

3.—*Cost of Fence or Gate.*—The cost of erection, maintenance and repair of any fence or gate required under this Act shall be borne by the owner of the land, provided that in so far as any fence substantially constitutes a dividing fence between land belonging to different owners, the person erecting the fence may require the other owner to pay him half the cost of erecting and maintaining such dividing fence or gates.

Where in the opinion of the committee the owner is unable to undertake the cost of erecting such fence with any gates that may have been ordered, the Minister may in his discretion, and subject to the provision of the necessary money by Act of Supply, direct that the cost be defrayed in the first instance by the Government, and in such a case the provisions of Section 3 of Act No. 6, 1907, shall apply in regard to the repayment of the cost with interest.

4.—*Attendants at Gates.*—It shall be the duty of the committee by whose orders any gate has been placed across a public road to place attendants in charge of the gate at all times, whose duty it shall be to prevent any cattle from passing without the proper permit which may be required for that purpose.

In any case in which a gate has been authorised by the committee on application to them the duty of placing and keeping attendants in charge shall rest with the applicant.

5.—*Minister to take Advice of Committees.*—Before making any order under the authority of Acts No. 32, 1903, and No. 54, 1906, or this Act, the Minister shall, if time permits, inform the committees for the districts affected thereby of the proposed action, in order to receive their advice thereon.

6.—[Repealed by Act No. 20, 1910.]

7.—*Punishment for Wilfully Conveying Ticks.*—Any person found in possession of, or who knowingly conveys, a tick or ticks from any place to any other without the authority in writing of the Minister of Agriculture, or who knowingly and wilfully does any act calculated to spread the disease of East Coast Fever, shall be guilty of an offence cognisable in the Court of a Magistrate and punishable by imprisonment with or without hard labour for a term not exceeding five years.

8.—*Powers of Committees.*—The regulations under Acts No. 32, 1903, and No. 54, 1906, may empower the several committees, subject always to any orders or instructions given by the Minister, to exercise the following powers within their respective districts:—

- (a) To decide all matters relative to the movement, quarantine, isolation, branding, dipping, or cleansing of cattle, and of things likely to carry infection, and to issue and enforce such orders for that purpose as the Minister is by the aforesaid Acts empowered to make.
- (b) To appoint permit officers for the issue of any permits required for the removal of cattle or for any other purpose for which permits may be required.
- (c) To order and enforce the destruction of cattle under the provisions of Section 6 of Act No. 54, 1906.

9.—*Disobedience of Orders.*—Any person who wilfully disregards the order of a committee made under the provisions of this Act shall be liable to the same penalties as are provided for the disobedience of orders made under Act No. 32, 1903, and if any person fails to erect or maintain in good order and repair any fence or gate as required under this Act the committee may engage any other person to do the work and may recover from the owner of the land the whole cost of such work done and any costs incurred in a suit in the Magistrate's Court at the instance of the chairman.

10.—*Charges and Rates Leviable by Committees.*—A committee may make charges for the issue of permits for the removal of cattle and for any other permits issued by any member thereof or by any person appointed by them for that purpose, such charge not to exceed one shilling for each permit issued.

A committee may also levy a rate on cattle owners, other than Natives who are not landowners, in the district, such levy not to exceed sixpence per head per annum on the cattle owned by such persons.

Such charge may be enforced by process for recovery by civil suit in the Court of a Magistrate by the Chairman of the Committee exercising authority over the district in which the cattle owner resides or in which such owner's cattle are found.

The monies so received shall form a fund for defraying the expenses incurred by the committee, including payment of railway fares of members when travelling on committee business, but not including personal expenses of members, in carrying out their duties.

11.—*Exclusion of Native Locations and Reserves.*—The powers given by this Act or the regulations to committees shall not extend to any Native location, or any Native reserve in the Province of Zululand, or to any Native mission reserve.*

12.—*Minister may Prohibit Cattle Dealing without Permit.*—The Minister may from time to time, by Order published in the *Natal Government Gazette*, direct that no person shall buy, or acquire by barter, or gift, or otherwise, any cattle within any specified part or parts of the Colony, except under and subject to the conditions of a permit granted by the Minister for that purpose.

Every such permit shall state the division or district within which it is to be used, and the conditions, if any, to be observed.

The issue of a permit shall be in the discretion of the Minister and a permit may at any time be revoked by him.

13.—*Amendment.*—The words “or from one place to another within an infected area” shall be inserted after the word “colony” in Section 8 of Act No. 32, 1903.

14.—*Holding over Land after Expiration of Lease.*—(1) Any tenant of land who keeps thereon ten or more head of cattle and who at the expiry of his lease is prevented, in consequence of an order made under any of the Acts relating to East Coast Fever or other cattle diseases, from removing the cattle to another place where he would otherwise be able to keep them, shall have the right to hold over and retain the land in the same manner as if the lease were extended until the disability occasioned by the order ceases.

(2) Nothing in this section shall be deemed to relieve any person from the other obligations of his lease or to prevent his being ejected on account of a breach thereof.

(3) If the circumstances are such that the whole of the land is not required by the tenant for the purpose of keeping and grazing his cattle, but that a part thereof can be set apart (including, in those cases where the tenant resided on the land during the lease and stabled his cattle there, a suitable residence for the tenant and accommodation for his cattle), the landlord may, at his option, upon the expiry of the lease, resume the remainder

* Section as amended by Sec. 4 (1) of Act No. 20 1910.

of the land, and the tenant shall be required to pay him such rent only as bears the same proportion to the whole rent under the lease as the value of the part retained to the whole.

- (4) The word lease as used in this section refers to any written or oral agreement of lease, sub-lease, or the like, and where a tenant is authorised to remain in possession of land previously held under a sub-lease, the owner of the land and all intervening lessees shall be required to allow the land to be retained in accordance with this Act.
- (5) Any question arising under this section may be brought before the Magistrate by way of application on notice. The Magistrate may take or call for such evidence as he may require, and may refer any question for the report of some competent referee and may adjudicate upon the question at issue. The costs of all proceedings and expenses of reference shall be borne as the Court shall direct.

15.—*Value of Cattle Taken.*—If the price to be paid by the Government for any cattle taken under the provisions of Act No. 8, 1907, be not agreed between the Government and the owner, it shall be decided by the valuation made by three persons, one appointed by the District Veterinary Surgeon, or in his absence by the officer representing the Department, one by the owner, and one by the Chairman of the Committee for the district. The valuation shall be decided by the votes of a majority of the three persons aforesaid, provided that the valuation shall in no case exceed the rates appointed by the schedule of the said Act.

ACT NO. 20, 1910.

“To authorise loans by Government for the construction of dipping tanks and the erection of fences and to extend the provisions of the East Coast Fever Acts.”

1.—*Minister may Advance Cash or Supply Fencing Material on Loan.*—The Minister of Agriculture may, upon application, make loans to owners of land, or to lessees or other occupiers of land, to assist them in constructing dipping tanks for cattle and in erecting fences within the boundaries of their farms. Any person other than an owner must furnish approved security for the proposed loan. The Minister may, in place of making a loan for purposes of fencing, supply fencing material, and in such case the price charged by the Government for such material, together with all cost of carriage and incidental expenses, shall, for the purposes of this Act, be deemed to be a loan. An account certified by the Chief Accountant of the Department of Agriculture shall be sufficient evidence

of the amount of such loan. The regulations under this Act may prescribe all details and procedure in connection with the granting of loans, but no loan for the construction of a dipping tank shall exceed £100, and payment will not be made until the tank is satisfactorily completed and ready for use. The word "owner," as used by this Act, means a registered owner or the holder under certificate of sale or allotment of land bought from the Government.

2.—*Repayment of Loans.*—All such loans shall be repaid, together with interest thereon at the rate of five per cent. per annum, by thirteen equal yearly instalments, the first payable two years after the date on which the loan is made or the fencing material is first supplied by Government, subsequent instalments being payable at the end of each period of twelve months from the due date of the first instalment. Nothing in this section shall, however, prevent a borrower from paying off his whole liability, with interest to date of payment, at any time if he should wish to do so.

3.—*Liability of Successive Owners for Payment.*—In the case of a loan to an owner, the unpaid instalments, with interest, shall be payable by the owner for the time being of the land upon which the dipping tank was constructed, or the fencing erected, for which the loan was made. Every such owner shall accordingly be liable for the instalments and interest as they fall due in the same way as if the loan had been made to him, and he shall be entitled to recover any sums which he may have paid from the person to whom the loan was actually made unless such claim has been mutually adjusted in the price of the land or otherwise. In the case of a loan to a tenant, he and his successors in the tenancy shall, together with the sureties, be liable for the instalments falling due during the tenancy and for the interest thereon, and any further instalments, with the interest thereon, shall be payable by the owner for the time being, in accordance with the provisions of the first paragraph of this section.

4.—*Amended System of Local Option in regard to the Enforcement of Dipping.*—(1) Section 6, and the reference thereto in Section 11 of Act No. 32, 1908, are hereby repealed.

(2) The Minister, acting with the Advisory Commission established under this Act, may by notice in the *Government Gazette*, divide any Magisterial Division into two or more districts for the purposes of this section.

(3) The Magistrate of any Division shall, upon receiving a requisition signed by not less than fifteen persons, being registered voters and owning cattle in the Division, or in any such district as aforesaid, call a meeting of cattle-owners, being registered voters of the Division or district, as the case may be, to consider the question of enforcing the dipping or cleansing of cattle.

- (4) Notice of the time and place appointed for the meeting shall be published four times in some newspaper or newspapers circulating in the Division, the first notice being published two weeks at least before the appointed time.

The Magistrate or his deputy shall preside at the meeting. Any person being a registered voter and owning cattle within the Division or district, as the case may be, may attend and vote at the meeting.

The meeting may be postponed to a convenient date, if necessary, on account of stress of weather, or for any other reason which the Magistrate may consider proper. Notice of such a postponement of the meeting shall be published as aforesaid at least twice.

- (5) If the meeting be attended by not fewer than thirty persons entitled to vote (of which the Chairman shall decide), and a resolution be passed by the majority in favour of compulsory dipping or cleansing, the Magistrate shall report the same to the Minister, who shall thereupon issue an order making it compulsory for all cattle within the Division or district, as the case may be, to be dipped or cleansed in such manner and at such intervals as he may prescribe, and such order may be enforced by the several Advisory Committees within the Division or district, or by any persons whom the Minister may direct to execute such order.

If the meeting be not attended by the prescribed number of qualified persons, or if such resolution as aforesaid be not passed, the Magistrate shall not be again required to convoke a meeting within the next three months.

- (6) For the purposes of this section, every municipal borough or township established under Law No. 11, 1881, or a like Act, shall be regarded as a district within the meaning of the preceding sub-sections, and the remainder of the Magisterial Division in which such borough or township is situated shall be treated as if it were an entire Division.
- (7) In every borough or township in which a resolution has been passed, and an order made by the Minister as aforesaid, the Town Council or Local Board shall be required to construct and maintain so many good and sufficient dipping tanks for cattle as may, in the opinion of the Principal Officer of the Veterinary Department, be required for the dipping of cattle in such borough or township.

Should any Town Council or Local Board fail to construct the required number of tanks within a time to be notified by such officer after the issue of such order as aforesaid, or to maintain them ready and fit for use, the Minister shall be empowered to construct such tanks or to repair or maintain them, and the expense incurred shall be recoverable from the Town Council or Local Board.

- (8) The Natal Native Trust shall, in like manner, be required to erect and maintain dipping tanks in any Native Location or Mission Reserve whereof they are trustees, situated within a Division or district in which a resolution has been passed and an order made as aforesaid.

5.—*Advisory Commission.*—The Governor in Council shall, in the month of March in each year, or so soon thereafter as may be, appoint five persons having a practical knowledge of cattle-farming, and not being in the Government employ, to be an Advisory Commission, the function whereof shall be to offer advice to the Minister upon any subject connected with the administration of the East Coast Fever Acts and the suppression of the disease. The Commission may elect its own chairman.

6.—*Amending Powers of Committee to Order Fencing.*—Sub-section (a) of Section 1 of Act No. 32, 1908, is hereby repealed, and in place thereof is enacted the following sub-section:—

- (a) To require any person to erect one half of such boundary fences on his farm or land as they may direct, and to keep the same in good order and repair. The fences shall be of such a kind and standard as the committee may prescribe, but not of more expensive character than those required by the Fencing Laws Nos. 30 and 36, 1887.

7. The Governor may from time to time make any regulations required for the purposes of this Act.

III.—LUNGSICKNESS.

[LAWS.—Act 30, 1897; Act 15, 1907.]

Act No. 30 of 1897 is the principal Act in existence for the purpose of dealing with Lung sickness. It provides for the appointment of Inspectors for the purpose of examining cattle, and for the granting of licenses to the owners of infected herds for periods of three months, the license being renewed at the end of three months if the disease has not been eradicated by drenching or inoculation or by other means within

that time. These licensed cattle have to be isolated, and the owner is liable for any damage caused by the trespass of such cattle. In all sales, public or private, the responsibility lies with the vendor; and recently inoculated or drenched cattle are not to be put up for sale. Lungsick cattle found in public places may be destroyed. The Act also makes provision for the declaration of infected areas. Provision is made for dealing with infected cattle in pounds.

The above does not exhaust the provisions made by this Act, but includes all the more important ones.

Act No. 15 of 1907 merely amends the above Act in so far as compensation for the destruction of cattle by order of the Veterinary Department is concerned.

ACT No. 30, 1897.

"For the better prevention of Lungsickness among the Cattle of the Colony."

Short Title: "The Lungsickness Prevention Act, 1897."

3.—*Interpretation of Terms.*—In this Act the expression "owner," when used with reference to the ownership of cattle, shall mean the actual owner, or the person in whose possession or control such cattle shall be for the time being, or the occupier or lessee of land on which the cattle shall then be with his knowledge and consent; and in cases where cattle, the ownership of which is in dispute, belong to, or are running with, the cattle belonging to any Native kraal, the expression "owner" shall mean and include the headman of the kraal or group of kraals to which such cattle may belong, or at which such cattle may be running or may be kraaled; and where cattle shall be found grazing or running on land the property of any borough, or township proclaimed under Law No. 11, 1881, or on waste lands of the Crown, or on any lands set apart for any township or village, the expression "owner" shall mean the person in whose use or possession, or under whose control, or in whose charge such cattle last were or had been within one month previous to the time of their being so found grazing or running.

The expression "owner" is furthermore to "include a partnership, company, or corporation."*

The word "vendor" in this Act shall, in all cases where the person instructing any agent or auctioneer to sell any cattle resides within this Colony, be taken and deemed to mean the person so instructing the said

* Amendment introduced by Sec. 1 of Act No 15, 1907.

agent or auctioneer; but where the person so instructing the said agent or auctioneer resides beyond the boundaries of this Colony, then the agent or auctioneer so instructed shall be taken and deemed to be the "vendor" of such cattle for all the purposes of this Act, unless, in the case of an auctioneer, such auctioneer shall, before offering each lot of cattle for sale, announce that such cattle are from beyond the boundaries of the Colony: Provided, however, that this exception in favour of an auctioneer shall not apply in any case where it shall be proved that the auctioneer, during the time that the cattle in question were being offered for sale, refused to inform any person whether the said cattle were from beyond the Colony on such persons making enquiry of him to that effect.

The terms "cattle" and "animal" include all animals of the ox tribe.

The term "Magistrate" shall include any Assistant Magistrate.

The term "herd" shall include a single animal, or any number of cattle running together.

The term "inoculation" shall mean the subcutaneous introduction into the system of cattle of the specific virus of lungsickness.

The term "drench" shall mean the internal administration of virus taken from the lung or chest of the animal infected with lungsickness.

"Lungsickness" shall mean the disease known as pleuro-pneumonia.

4.—*Responsibility of P.V. Surgeon.*—The Principal Veterinary Surgeon of the Colony shall be responsible for carrying out the provisions of this Act, and of any orders, rules, and regulations made under authority of this Act throughout this Colony.

5.*—*Appointment of Inspectors.*—The Minister of Agriculture may from time to time appoint an Inspector or Inspectors of cattle for this Colony, or for any district thereof, and may from time to time remove or dismiss such Inspector or Inspectors; and every person so appointed shall have full power, should he have reason to believe that any cattle may be infected with lungsickness, at any time to inspect such cattle within this Colony, or the district thereof for which he shall be appointed, wherever such cattle may be kept, driven or depastured, and shall have, exercise, and discharge within this Colony, or the district thereof for which he shall be appointed, the several powers, authorities, and duties hereinafter mentioned, and if any person shall refuse to allow any Inspector to enter upon his land, pasturage, or premises, or to examine any cattle belonging to him, or in his care or possession, or shall attempt to impede or hinder any Inspector from examining such cattle or shall give false information regarding the last outbreak, or shall not, when required by any Inspector, render him every reasonable assistance, or, after demand made by the Inspector, shall fail to collect and produce to him within

* As amended by Sec. 3 of Act No. 15, 1907.

reasonable time his herd or herds of cattle, such person shall, on conviction before any Magistrate, forfeit and pay any sum not exceeding Ten Pounds Sterling for each offence, or in default of payment thereof, be imprisoned for any period not exceeding two months.

6.—*Appointment of Other Officers.*—The Minister of Agriculture may, from time to time, appoint, and remove, Inspectors to enforce and carry out in Native Locations the provisions of this Act, and such other officers throughout the Colony as may be necessary for the purposes of this Act, all which inspectors and officers shall be officers of the Department of the Principal Veterinary Surgeon of the Colony.*

7.—*Offence of Obstructing Officer in Execution of his Duty.*—If any person obstructs or impedes an officer acting in execution of this Act or of any orders, rules, or regulations thereunder, he and every person aiding and assisting him therein shall be guilty of an offence against this Act, and the officer, or any person whom he calls to his assistance, may seize the offender and take him before a Magistrate, to be dealt with according to law.

8.—*License to Keep Infected Herd.*—In the event of any herd being declared by a Government Veterinary Surgeon or such Inspector to be infected with the disease of lungsickness, the owner of such herd shall be granted a license, conforming as near as may be to the form of license set forth in Schedule B, to keep such cattle for a period of three months for the purpose of drenching or inoculating the herd and at once destroying any animal which a Government Veterinary Surgeon or Inspector declares to be showing symptoms of lungsickness. Every such license shall contain a condition that the cattle thereby licensed shall, at the owner's option, be at once drenched or inoculated to the satisfaction of the Inspector, and that all animals showing symptoms of the disease shall be immediately destroyed. At the expiry of such license the Government Veterinary Surgeon or Inspector shall re-inspect such herd, and should there have been a case of lungsickness in such herd within the period of the license, the license shall be renewed for a further period of three months, dating from such last appearance, and such inspection shall be renewed every three months until such herd is found free from the disease. No cattle shall be allowed to be removed from the land on which they are licensed until the Government Veterinary Surgeon or Inspector shall declare the herd clean, under a penalty not exceeding Twenty-Five Pounds Sterling, or, in default of payment thereof, to imprisonment not exceeding three months.*

9.—*Owner to give Notice of Outbreak of Disease.*—On the outbreak of lungsickness in any herd of cattle, or, should there be no outbreak, in

* As amended by Sec. 3 of Act No. 15, 1907.

the case of inoculation or drenching, the owner of such cattle shall forthwith give notice of the disease, either by word of mouth in presence of a witness, or in writing, to the owners or occupiers of adjoining properties, if resident, and, if not resident, then to the servants of such owners or to any other person occupying the land, and to the District Veterinary Surgeon, or to the Local Inspector appointed under this Act, who shall thereupon inform the Principal Veterinary Surgeon of the Colony. In case of neglect or failure to comply with the requirements of this section, the owner of such cattle shall, on conviction, be liable to a fine not exceeding Twenty Pounds Sterling for each such offence, and in default of payment be imprisoned for a period not exceeding three months.**

10.—*Licensed Cattle to be Isolated.*—All cattle so licensed shall be isolated by herding, or otherwise, at a distance not less than ten yards from the boundary of the property on which they are licensed, and from any public road.

For every breach of this provision the owner shall be liable, upon conviction in the Court of a Magistrate, to a fine not exceeding Thirty Pounds Sterling, or, in default of payment, to imprisonment with or without hard labour for any term not exceeding six months:

Provided that should it be proved to the satisfaction of the Government Veterinary Surgeon or Inspector in the case where a farm is intersected by a public road or roads, that it is absolutely necessary for licensed cattle to cross or be driven along such road or roads on such farm the Inspector is empowered to allow such removal under the restrictions contained in Section 13 of the principal Act.†

11.—*Liability of Owner for Damage Caused by Trespass of Cattle.*—Any owner allowing cattle from a licensed herd to trespass, shall be liable for all damage caused by such trespass to any herd with which the diseased cattle so trespassing may have come in contact: Provided always, that infection be proved by the outbreak of lung-sickness, to have been communicated within twenty-one days by such contact, and that immediate notice has been given to the owner, if known, or as soon as known, of such cattle so trespassing.

12.—*Destruction of Infected Cattle not being on their Owner's Land.*—If any cattle being on or driven along any public road, highway, or street, or on lands set apart as commonage for any town or village, or for public outspan, or on land which is not in the lawful occupation of the owner of such cattle, should show symptoms of being infected with lung-sickness, the person in charge of such cattle shall immediately destroy

* As amended by Sec. 4 of Act No. 15, 1907.

** As amended by Sec. 5 of Act No. 15, 1907.

†As amended by Sec. 7 of Act No. 15, 1907.

such cattle, and have them buried or burned, or otherwise destroyed; and in case of his failing to do so, shall, on conviction, pay a fine not exceeding Twenty-five Pounds Sterling, or in default thereof be imprisoned for a period not exceeding three months.

13.—*How Remainder of Cattle are to be dealt with.*—The remainder of such cattle shall not be driven along any public road, township, outspan, street or village, without the owner first informing the nearest Magistrate, Fieldcornet, or Inspector, who shall place such cattle under license, and who, at his discretion, may order such cattle either to be isolated, as provided for under Sections 8 and 10 of this Act, or forwarded to their destination under supervision, and by sending a person or persons, at least one hundred yards in advance of such cattle, to warn travellers of the approach of infected cattle, and to prevent such cattle coming in contact with any cattle that may be at, on, or near, a public road, outspan, highway, street, or village, under a penalty not exceeding Twenty-five Pounds Sterling, or in default of payment thereof, to imprisonment for any period not exceeding three months, and shall further be liable for any damage caused through infection, as provided in Section 11 of this Act.

14.—*Application of Section 12 to Cattle Seized by Officer of Government.*—The provisions of Section 12 of this Act shall apply to any cattle seized, levied on, or forfeited by any officer of the Government or of the law, and to any person who may remove any such cattle.

15.—*Public Auction: Implied Warranty against Lungsickness.*—Whenever any cattle shall be sold at any public auction, or by the market master at any public market, the auctioneer or market-master shall be bound to warrant, and shall be deemed to have warranted, all and every such cattle to be free from lungsickness, and if any such cattle shall die of or exhibit symptoms of being infected with such disease within fourteen days from date of sale, exclusive of such day, the auctioneer or market-master may be sued under such implied warranty for restitution of the price paid for such diseased cattle. The provisions of this section shall not apply to sales of cattle by poundmasters under the provisions of the Pound Law, 1874, or Law No. 16, 1880.*

16.—*Liability of Vendor in Public Sales.*—If any person who shall purchase cattle at any public auction, or at any public market, shall prove that he has sustained damage from lungsickness which may have broken out within thirty days after the date of such purchase in the herd which was in his possession at the time he bought such cattle, and that any of the cattle so bought have shown symptoms of lungsickness previous to any animal belonging to the said herd showing such symptoms, and if it shall be proved that the vendor was aware, or had sufficient opportunity to be

* Both these Laws were repealed by Act No. 42, 1898.

aware, that any such cattle were so diseased, or had been running among cattle so diseased, at or within two months previous to the time of sale, then such vendor shall be liable to make good all loss or damage which the vendee may have sustained by reason of such diseased cattle so purchased communicating such disease to cattle the property of the purchaser.

17.—*Private Sales: Implied Warranty by Vendor.*—In all private sales of cattle the vendor shall be deemed to have warranted the same, and shall be in all respects liable under such implied warranty as if such cattle had been sold at a public sale, unless it shall have been otherwise stipulated and agreed in writing between the vendor and vendee, or their agents.

18.—*Recently Inoculated or Drenched. Cattle not to be brought to Public Sale.*—It shall not be lawful to expose for sale, or to sell at any public auction, or at any public market, any inoculated or drenched cattle, unless the same shall have been inoculated or drenched not less than six weeks previously to the day of sale; and if any person who shall purchase any such cattle shall prove that the same have been inoculated or drenched within six weeks previous to the day of sale, he shall be entitled to annul the sale, and sue the vendor for restitution of the price paid for such cattle, and for all loss or damage which the vendee may sustain in the event of such diseased cattle communicating lung sickness to other cattle.

19.—*Private Sales: Implied Warranty against recent Inoculation, etc.*—Whenever inoculated or drenched cattle shall be sold in any private sale, the vendor shall be deemed to have warranted that the same have not been inoculated or drenched within six weeks previously to the date of the sale; and if the vendee shall prove that they have been so inoculated or drenched within such period of six weeks he shall be entitled to annul the sale, and to sue the vendor for restitution of the price paid for such cattle; and if it shall be proved that the vendor was aware that any such cattle had been inoculated or drenched within the period of six weeks prior to the day of sale, then such vendor shall, in addition, be liable to make good all loss or damage which the vendee may sustain in the event of such cattle communicating lung sickness to other cattle: Provided such warranty may be waived or modified by written agreement between the vendor and the vendee, or their agents.

20.—*In Action for Damages Vendee to prove steps taken to Prevent Spread of Disease.*—It shall be incumbent on the vendee, when suing for damages, to show that he has taken precaution to prevent the spread of lung sickness amongst his herd as soon as he saw any symptoms that such disease had broken out amongst the said purchased cattle, and that he had, with that view, taken care, as far as possible, to keep the said purchased cattle separate from the said herd, after the discovery of such

symptoms, as aforesaid, and the extent to which such precautions shall have been taken shall be considered by the Court when awarding damages.

21.—*Forms and Proceedings to be taken by Vendee.*—No action for restitution of the purchase price of any such purchased cattle which may have shown symptoms of lung sickness, or for damages caused by such cattle communicating the disease, shall be sustained under the provisions of this Act, unless, within forty-eight hours of the first symptoms of lung sickness having been seen in the said cattle by the vendee or any of his servants, the said cattle shall have been examined by two witnesses, and unless notice that such symptoms have been seen has been given within forty-eight hours as aforesaid to the auctioneer or market-master and to the vendor. Such notice shall not be considered given unless it shall have been delivered at the usual residence of the person for whom it is intended, or if such residence is more than twenty miles from the place where such diseased cattle then are, the said notice shall have been sent by telegraph where available or through the post in the usual way, of which sending proof may be demanded; but if two witnesses do not examine the said diseased cattle, as provided in this section, the said action shall be sustained if information that such cattle show symptoms of lung sickness shall have been delivered to the nearest Magistrate, Field-cornet, or Inspector, within seventy-two hours of such symptoms having been seen as aforesaid, who shall cause the said cattle to be inspected, and if either of the said officers, or anyone on his behalf, or either of the said witnesses shall have reasonable cause to believe the said cattle to be affected with lung sickness, such person shall destroy one of the said cattle, and shall examine it to ascertain more certainly whether it was affected with lung sickness; and if such person find the said cattle to be so affected, he shall take the necessary steps to identify the said purchased cattle and all other cattle in the possession of the vendee with which such purchased cattle may have been running, and the Court when awarding damages shall take into consideration all reasonable expenses which may have been incurred by the vendee or in his behalf in connection with such purchased cattle.

22.—*Landowner or Occupier may Destroy Lung-sick Cattle found on his Land.*—Any person finding any cattle, showing symptoms of lung sickness, on any land, his property or in his lawful occupation, may destroy such cattle on his own responsibility, and shall open and examine all cattle so destroyed in the presence of disinterested and competent witnesses: Provided, that the owner of such cattle so destroyed shall not be entitled to recover compensation for such cattle if the person so destroying them can prove, by his own evidence and the evidence of two of the said witnesses, that such cattle were infected with lung sickness when so destroyed; and also provided the person so destroying such cattle shall

report that he has done so, by despatching either a verbal or written message to the Magistrate or Inspector of the district in which he resides within twenty-four hours after the killing of such cattle, and stating in such report the marks of the cattle so killed.

23.—*Destruction of Lungsick Cattle found on Public Highway, &c.*—Any cattle showing symptoms of lungsickness being on, or driven along any public highway or street, or on lands set apart as commonage for any town or village, or for public outspan, may be destroyed by any person on his own responsibility, on the conditions provided in the last preceding section, or any person may send information respecting such cattle to the nearest Magistrate, Fieldcornet, or Inspector, and such officer shall forthwith cause such cattle to be destroyed if such officer or the person sent on his behalf to destroy such cattle has reasonable cause to believe them to be infected with lungsickness, and such officer or person shall forthwith cause such cattle so destroyed to be opened and examined, and should the said cattle be found to be free from lungsickness, compensation shall be granted as provided for under Section 24 of this Act; and each Magistrate or Inspector shall keep a record of all cases of cattle so destroyed within his district, and shall furnish a copy thereof to the Principal Veterinary Surgeon.

24.—*Compensation for Destroying of Healthy Animals.*—If upon the examination of the organs of any animal destroyed under the provisions of this Act, it shall be ascertained that such animal was not suffering from lungsickness, the owner shall be entitled to be paid from the public revenue the value of such animal immediately before death: Provided that the payment shall in no case exceed the rates set forth in Schedule C.

25.—*Control of Infected Cattle.*—Any owner of cattle who may allow, or cause the same to be driven or herded, or permit the same to stray on any public road, street, market, or on any land other than such as is his property, or of which he is the lawful occupier, knowing the same to have been inoculated or drenched within six weeks previous thereto, or to be affected with lungsickness, shall, on conviction, pay a fine not exceeding Twenty Pounds Sterling, or in default thereof be imprisoned for a period not exceeding three months.

26.—*Declaration of Infected Areas.*—Whenever it shall come to the knowledge of a Magistrate that any animal within the Division is affected with lungsickness, it shall be lawful for such Magistrate, upon notice to the occupier of the land on which such animal is, to declare such land or any portion thereof an infected area, and to prohibit the removal of any animal from such land for a sufficient period, to be stated in such notice, to enable the Governor, if he thinks fit, to issue the proclamation referred to in the next succeeding section.

Such notice shall be published in some newspaper circulating in the Division and posted at the office of the Magistrate.

From and after such notice and prohibition, and during such period, the owner of any such animal in such infected area who shall allow any such animal to stray, or be removed out of such infected area shall be guilty of an offence against the provisions of this Act.

27.—*Governor may Proclaim Infected Areas.*—Whenever lung sickness is known to exist among animals in any Division, the Governor may, by proclamation, declare such Division, or any area embracing or forming part of such Division, to be an infected area, and may by such proclamation order and direct that it shall not be lawful to remove any animals from such area, whether the same are or are not infected with lung sickness.

28.—*Repeal or Alteration of such Proclamations.*—The Governor may, by proclamation, repeal or alter any such proclamation as in the last preceding section is mentioned, or may declare any proclaimed area or any part thereof to be no longer an infected area.

29.—*Onus probandi in cases of Disputed Ownership.*—In all cases of disputed ownership of cattle under this Act the onus of proving that some other person is owner shall rest upon the occupier or lessee of the land on Natives or the headman of the kraal or group of kraals to which such cattle may belong, or at which such cattle may be running or may be kraaled, and in cases of cattle found grazing or running on town, village, or waste lands of the Crown, on the person in whose use or possession, or under whose control or charge such cattle shall have been or had been within one month previous to the time of their being found so grazing or running.

30.—*Lungsick Cattle in Public Pounds to be Destroyed.*—Every poundmaster shall, so soon as any animal in the pound appears to him to show symptoms of lung sickness, cause such animal to be destroyed in the presence of two witnesses, and in the presence of such witnesses shall open and examine the said animal, to ascertain whether it had been infected with lung sickness.

31.—*Poundmasters to Report Outbreaks.*—Poundmasters are, under this Act, required to immediately report to the Magistrate or Inspector the appearance of lung sickness in the pound, and the Magistrate or Inspector may order the slaughter of all cattle in the pound up to the number of five, provided the poundmaster can prove actual contact has existed with the infected beast. If any number above five are in the pound at the time, the conditions of Sections 8 and 10 shall be enforced. In case a pound shall become infected by reason of the pounding therein of infected cattle, it shall be the duty of the poundmaster to establish another

pound at a safe distance from the pound so infected. No impounding of cattle can take place in the pound so infected until such pound is declared by the inspector to be free from disease. The Inspector or Magistrate shall cause to be made known, by advertisement, the fact of the pound being infected.

32.—*Poundmasters to declare date of last case in Pound before Sale.*—The poundmaster shall not sell any cattle at the pound, unless he shall have first publicly, at the time of such sale, declared at what date the last case of lungsickness occurred in the pound.

34.—*Penalty on Poundmasters for Neglect.*—For each act or neglect of any part of his duty under this Act, the poundmaster shall be liable, on conviction, to a fine not exceeding Five Pounds Sterling.

35.—*Infected Areas within Commonages.*—Every commonage of, or set apart for, any borough, township, or village, whether proclaimed under Law No. 11, 1881, or not, shall, for the purposes of this Act, be regarded as a farm, and it shall be competent for the Governor in Council to proclaim certain areas within such commonages or lands to be infected, the owners of the cattle within such areas to be under all the obligations and penalties of this Act.

36.—*Destruction of Cattle in Boroughs.*—Any cattle destroyed under the authority of this Act within the boundaries of any borough, or township proclaimed under Law No. 11, 1881, may be dealt with as the then existing laws or bye-laws of such borough or township may provide.

37.—*Introduction of Lungsick Cattle into Colony.*—Any person bringing, or causing to be brought into the Colony, any cattle knowing them to be infected with lungsickness, or knowing that they have been inoculated or drenched within six weeks previous to the date of the arrival of such cattle in the Colony, shall for every such offence, on conviction, pay a fine not exceeding One Hundred Pounds Sterling, or in default of payment, be imprisoned for any period not exceeding six months, and in addition shall be liable for damages caused by infection from such cattle, accruing within thirty days after the date of such arrival.

38.—*Prohibiting Introduction of Cattle.*—The Governor in Council may, by proclamation, prohibit the introduction into Natal of any cattle from any country in which lungsickness shall be prevalent.

41.—*Contraventions of Act.*—Every breach of this Act, or any part thereof, and the omission to do any act, matter, or thing required to be done, and not so done, under and in strict accordance with the provisions hereof, shall be deemed and taken to be contraventions of this Act.

42.—*Penalties.*—For any contravention of this Act for which no special fine or other punishment is imposed, a fine may be inflicted, not exceeding, in each case, the sum of Twenty Pounds Sterling, or in default

of payment thereof to imprisonment, with or without hard labour, not exceeding three months.

44.—*Actions against Persons relying for their Authority on this Act.*—An action or proceeding shall not lie against any person acting or intending to act under the authority, or the execution or in pursuance of this Act for any alleged irregularity or trespass or other act or thing done or omitted by him under this Act, unless notice in writing (specifying the cause of the action or proceeding, and the name and residence of the intending plaintiff or prosecutor, and of his attorney or agent in the matter) is given by the intending plaintiff or prosecutor to the intended defendant one month at least before the commencement of the action or proceeding, nor unless the action or proceeding is commenced within three months next after the act or thing complained of it done or omitted, or in case of a continuation of damage, within three months next after the doing of such damage has ceased.

45.—*General Plea Sufficient.*—In any such action the defendant may plead generally that the act or thing complained of was done or omitted by him when acting or intending to act under the authority or in the execution, or in the pursuance of this Act, and may give all special matter in evidence.

46.—*Plaintiff restricted to his Notice.*—On the trial of any such action the plaintiff shall not be permitted to go into the evidence of any cause of action not stated in his notice.

47.—*Tender of Amends or Payments into Court.*—The plaintiff in any such action shall not succeed if tender of sufficient amends is made by the defendant before the commencement of the action; and in case no tender has been made the defendant may, by leave of the Court in which the action is brought, at any time pay into the Court such sum of money as he thinks fit, whereupon such proceeding and order shall be had and made in and by the Court as may be had and made on the payment of money into Court in any ordinary action.

48.—*Powers, Rights, etc., Additional to those Conferred by any other Law.*—All powers, rights and remedies given by this Act shall be in addition to, and not in derogation of any other powers, rights and remedies conferred by any other Law or enactment, and all such powers, rights and remedies may be exercised and put in force in the same manner, and by the same authority as if the Act had not been passed.

49.—*Prosecutions not to Affect Civil Remedy.*—A proceeding or conviction for any act punishable under this Act, or under any order, rule or regulation made pursuant to this Act, shall not affect any civil remedy to which any person aggrieved by the Act may be entitled.

*Schedule B.**

I certify that a herd of (*state number*) cattle belonging to on the farm in Ward County of are infected with lung-sickness, and I hereby grant to the said license to keep the same for three months from date, for the purpose of complying with the conditions of Sections 8, 9, and 10 of Act No. 30, 1897, as amended by Act No. 15, 1907, as endorsed hereon.

Dated this day of 19....

.....
Inspector.

*Schedule C.***

	£	s.	d.
1. Calves under twelve months	5	0	0
2. Yearlings (Oxen and Heifers)	7	0	0
3. Two-year-olds (Oxen and Heifers)	9	0	0
4. Cows and Heifers, three-year-olds and upwards	11	0	0
5. Oxen and Bulls	14	0	0

Act No. 15, 1907.

"To amend the Lung-sickness Act of 1897."

6. *Compensation.*—In the event of an animal being destroyed by the order of a Government Veterinary Surgeon or Inspector under the provisions of Section 4 of this Act, compensation shall be payable to the owner of such animal at the rates set forth in the Schedule A of this Act: Provided that in the case of the owner being guilty of any neglect in failing to report or of any undue delay in reporting an outbreak, no such compensation shall be payable.

* As amended by Sec. 8 of Act No. 15, 1907. Schedule A I have omitted as it consists only of the numbers and titles of Laws repealed by the present Act.

** As amended by Act No. 27, 1903.

†The amendments have been duly made, and it is accordingly only necessary to reproduce here Section 6 and the Schedule referred to therein.

Schedule A.

	£	s.	d.
Yearling oxen, up to	2	0	0
Yearling heifers, up to	3	0	0
Two-year-old oxen, up to	3	0	0
Two-year-old heifers, up to	4	0	0
Three-year-old oxen, up to	4	0	0
Three-year-old heifers, up to	5	0	0
Cows, 4-8 years, with calves, up to	7	10	0
Cows, 4-8 years, without calves, up to	6	10	0
Oxen, over 4 years, up to	7	0	0
Cows, 8-12 years, with calves, up to	6	0	0
Old cows, with calves, up to	5	0	0
Old cows, without calves, up to	4	0	0
Bulls, under 4 years, up to	3	0	0
Bulls, over 4 years, up to	4	0	0

IV.—RINDERPEST.

[LAWS.—Act 40, 1898; Act 28, 1903.]

Under the former of the two Acts noted above the sale of cattle is taken to imply a warranty against rinderpest, but this provision does not apply to pound sales. Act No. 28 of 1903 provides for the isolation and inoculation of infected or in-contact animals, at the expense of the owner. This Act also contains provision in regard to cattle sales on similar lines to those of Act No. 40, 1898.

ACT No. 28, 1903.

“To make Special Provision in regard to the Disease known as Rinderpest.”

1.—*Isolation and Inoculation of Infected or In-contact Animals.*—

If any Veterinary Surgeon or Stock Inspector shall have reason to believe that any cattle are infected with the disease known as Rinderpest, or have been in contact with an animal so infected, or have otherwise been exposed to the risk of infection, he shall be empowered to direct that such cattle be isolated and properly inoculated.

2.—*At Owner's Expense.*—The owner or, in his absence, the person having charge of any cattle shall be bound to carry out, at his own expense, such isolation and inoculation. If he shall fail to do so forthwith, the Veterinary Surgeon or Stock Inspector may have the isolation and inoculation carried out at the expense of the owner, or failing him, the person in charge.

3.—*Exercise of Authority by other Officers.*—If no Veterinary Surgeon or Stock Inspector be immediately available, the powers under this Act may be exercised by a Magistrate or by an officer of Police not being below the rank of Sergeant. Such Magistrate or Police officer shall, however, take immediate steps to inform the District Veterinary Surgeon or Stock Inspector, who shall as soon as possible attend in person.

4.—*Mode of Inoculation.*—The inoculation of any animal under this Act must in the first instance be effected with glycerinated bile or serum, and such inoculation must be to the satisfaction of an officer of the Veterinary Department, and as often as may in the opinion of that officer be necessary. Raw bile may be used for second and subsequent inoculations, if so desired, but ten days at least must elapse before the second inoculation.

5.—*Regulations.*—The Governor in Council may from time to time make regulations for carrying out the objects of this Act.

6.—*Offences and Penalties.*—Any person who shall contravene this Act, or a regulation thereunder, or who shall disobey or disregard any lawful order made by a person having authority, shall be liable, on conviction before a Magistrate, to a fine not exceeding Fifty Pounds Sterling, with the alternative of imprisonment, with or without hard labour, for any term not exceeding three months.

7.—*Order for Payment of Expenses.*—The Magistrate, when giving judgment upon any such charge, may also make an order for the payment of any expenses of isolation or inoculation to which the accused person may have become liable as aforesaid.

8.—*Cattle Sold at Public Auction to be Warranted.*—Whenever any cattle shall be sold at any public auction, or by the market-master at any public market, the auctioneer or market-master shall be bound to warrant, and shall be deemed to have warranted, all and every cattle to be free from rinderpest, and if any such cattle shall die of, or exhibit symptoms of being infected with, such disease within eight days from date of sale, exclusive of such day, the auctioneer or market-master may be sued under such implied warranty for restitution of the price paid for such diseased cattle.

9.—*Liability of Vendor for Consequent Damages.*—If any person who shall purchase cattle at any public auction, or at any public market, shall prove that he has sustained damage from rinderpest which may have

broken out within eight days after the date of such purchase in the herd which was in his possession at the time he bought such cattle, and that any of the cattle so bought have shown symptoms of rinderpest previous to any animal belonging to the said herd showing such symptoms, and if it shall be proved that the vendor was aware, or had sufficient opportunity to be aware, that any cattle were so diseased, or had been running among cattle so diseased, at or within one month previous to the time of sale, then such vendor shall be liable to make good all loss or damage which the purchaser may have sustained by reason of such diseased cattle so purchased communicating such disease to cattle the property of the purchaser.

10.—*Warranty by Vendor in Private Sales.*—In all private sales of cattle the vendor shall be deemed to have warranted the same, and shall be in all respects liable under such implied warranty as if such cattle had been sold at a public sale unless it shall have been otherwise stipulated and agreed in writing between the vendor and purchaser, or their agents.

11.—*In Suit for Damages Purchaser to Prove Precautions Taken.*—It shall be incumbent on the purchaser, when suing for damages, to show that he has taken precaution to prevent the spread of rinderpest amongst his herd as soon as he saw any symptoms that such disease had broken out amongst the said purchased cattle, and that he had with that view taken care, as far as possible, to keep the said purchased cattle separate from the said herd after the discovery of such symptoms as aforesaid, and the extent to which such precautions shall have been taken shall be considered by the Court when awarding damages.

12.—*Conditions to be Observed for Action to be Sustained.*—No action for restitution of the purchase price of any such purchased cattle which may have shown symptoms of rinderpest, or for damages caused by such cattle communicating the disease, shall be sustained under the provisions of this Act unless within seventy-two hours of the first symptoms of rinderpest having been seen in the said cattle by the purchaser or any of his servants, the said cattle shall have been examined by two competent European witnesses, and unless notice that such symptoms have been seen has been given within seventy-two hours, as aforesaid, to the auctioneer or market-master or to the vendor. Such notice shall not be considered given unless it shall have been delivered verbally, or by telegram, registered letter, or by hand, at the usual residence or place of business of the person for whom it is intended; but if two competent European witnesses do not examine the said diseased cattle, as provided in this section, the said action shall be sustained if information that such cattle show symptoms of Rinderpest shall have been delivered to the nearest Magistrate, Government Veterinary Surgeon, or Stock Inspector, within seventy-two hours of such symptoms having been seen as aforesaid, who

shall cause the said cattle to be inspected, and if any of the said officers, or either of the said witnesses shall have reasonable cause to believe the said cattle to be affected with Rinderpest, such person shall destroy one of the said cattle, and shall examine it to ascertain more certainly whether it was affected with Rinderpest; and if such person find the said cattle to be so affected he shall take the necessary steps to identify the said purchased cattle and all other cattle in the possession of the purchaser with which such purchased cattle may have been running, and the Court, when awarding damages, shall take into consideration all reasonable expenses which may have been incurred by the purchaser or in his behalf in connection with such purchased cattle.

13.—*Animals Diseases Act not Affected.*—Nothing in this Act shall be deemed to repeal any of the provisions of the Animals Diseases Act, 1894.

ACT No. 40, 1898.

1.—*Sale of Cattle Implied Warranty against Rinderpest.*—Whenever any cattle shall be sold by private contract, public auction, or by the market-master at any public market, the vendor, auctioneer, or market-master, as the case may be, shall, unless it be otherwise expressly stipulated, either in the conditions of sale or by special agreement, in writing with the purchaser, be bound to warrant, and shall be deemed to have warranted, all such cattle to be free from the disease of Rinderpest, and if any such cattle shall die of or exhibit symptoms of being infected with Rinderpest within eight days from the date of sale, exclusive of such day, the vendor, auctioneer, or market-master may, in the absence of such especial stipulation as aforesaid, be sued under such implied warranty for restitution of the price paid for such diseased cattle: Provided always, that the purchaser shall be bound to use all reasonable means to keep the cattle isolated.

2.—*Forms, etc., to be followed by Vendee.*—No action for restitution of the purchase price of any such purchased cattle which may have shown symptoms of Rinderpest shall be sustained under the provisions of this Act unless, within twenty-four hours of the first symptoms of Rinderpest having been seen in the said cattle by the vendee or any of his servants, the said cattle shall have been examined by two witnesses, and unless notice that such symptoms have been seen has been given within twenty-four hours as aforesaid to the auctioneer or market-master or to the vendor. Such notice shall not be considered to have been given unless it shall have been delivered in writing at the usual residence of the person for whom it is intended, if such residence be within twenty miles from

the place where the cattle then are, or if such residence be at a greater distance, unless the notice shall have been despatched through the post by registered letter properly addressed to the residence of such person, or shall have been despatched by telegraph where the telegraph is available.

3.—*Act not to apply to Pound Sales or Cattle that have left the Colony.*—The provisions of this Act shall not apply to sales of cattle by poundmasters under the provisions of any of the Pound Laws of the Colony, nor to cattle which may have been sold and may have left the Colony during the said period of eight days referred to in Section 1 of this Act.

4.—*Construction of Act.*—This Act and Act No. 38, 1894,* shall be construed together as one Act.

V.—TUBERCULOSIS.

[LAWS —Act 27, 1899 : Act 14, 1907]

The former of these Acts provides for the inspection and examination of cattle arriving in Natal by sea with a view to preventing the introduction of tuberculosis. All cattle, with the exception of those certified by veterinary officers approved of by the Minister of Agriculture shall be quarantined and tested with tuberculin, and animals found to have tuberculosis are to be destroyed unless the owner wishes to re-ship them. These provisions do not apply to cattle imported solely for slaughter. Act No. 14, 1907, amends and slightly extends the foregoing law.

ACT NO 27, 1899.

“To provide for the Inspection and Examination of Cattle arriving in this Colony by sea, and to prevent the Introduction of the Disease of Tuberculosis.”

1.—*Meaning of “Cattle.”*—The word “cattle,” as used in this Act, shall include all animals of the bovine tribe.

2.—*Importation of Cattle.*—No cattle shall be allowed to enter this Colony by sea or land except upon compliance with this Act.†

*Included in Part i. of the present chapter.

† As amended by Sec 2 of Act No, 14, 1907.

3.—*Examiners*.—One or more Veterinary Surgeons belonging to the Veterinary Department of the Colonial Government, to be called “Examiners,” shall be appointed by the Principal Veterinary Surgeon as examiners for the purposes of this Act.

Sections 4, 5 and 6 repealed by Act No. 14, 1907, and the following substituted therefor:—

All cattle imported into Natal by sea save those accompanied by certificates given by qualified Veterinary Officers approved of by the Minister of Agriculture, shall upon their arrival be quarantined until tested by the Examiner with tuberculin, and shall not be released from such quarantine until the Examiner certifies them to be free from any reaction indicating their being infected with tuberculosis in the form of the schedule to this Act.

Cattle imported into Natal over any inland border, may, at the discretion of the Minister of Agriculture, be required to be placed in quarantine at the place of entry, or upon their arrival at their destination, and there be tested with tuberculin by an officer of the Veterinary Department, and shall not be released from such quarantine until they are certified by such officer to be free from any reaction indicating their being infected with tuberculosis in the form of the schedule to this Act.

7.—*Disposal of Cattle found to have Tuberculosis*.—In the event of any such animal proving to be affected with the disease of tuberculosis it shall not be removed alive from the quarantine station, but shall be destroyed there: Provided that the owner may in cases of animals imported by sea have the option of returning or re-shipping the animal, in which case it shall be taken direct from the quarantine station to the vessel.*

8.—*Disposal of Carcass*.—The carcass of an animal so destroyed may be disposed of in such a manner as the owner may think fit: Provided that if the officer shall consider that the flesh is unfit for food, it shall not be disposed of for such purpose.

9.—*Expense to be Borne by Owner*.—All expenses of inspection, quarantine, destruction, and otherwise shall be borne by the owner of the cattle.

12.—*Obligation to comply with Rules*.—All owners or persons having charge of cattle brought to this Colony by sea or land shall comply with the obligations of this Act, and shall obey all lawful orders of the examiner or quarantine officer, and all rules made as aforesaid: and for any disobedience or wilful disregard of such obligations, orders, or rules, they shall be liable to a penalty not exceeding Twenty Pounds Sterling, to be recovered in the Court of a Magistrate by the Principal Veterinary or any proper officer of his Department.* *

*As amended by Sec. 4 of Act No. 14, 1907.

**As amended by Sec. 5 of Act No. 14, 1907.

13.—*Cattle Imported for Slaughter.*—The foregoing provisions of this Act shall not apply to cattle imported solely for the purposes of slaughter, provided that before being landed they shall be inspected by the examiner, and the owner or the importer shall sign and deliver to the examiner an undertaking to the effect that none of such animals shall be used or disposed of for breeding or for any other purpose than for slaughter for food.

14.—*Offences.*—Any person who shall give a false undertaking, or who shall use or dispose of any such cattle otherwise than for slaughter, shall, for every animal so used or disposed of or referred to in the undertaking, be liable to the like penalties as are hereinbefore provided.

*Schedule.**

Act No. 27, 1899.

No.

Date

I hereby certify that I have applied the tuberculin test to
 the property of imported
 by the ship and declare the
 same to be free from any reaction indicating the existence of the disease
 of Tuberculosis.

Signed

Examiner.

— — — — —
 ACT No. 14, 1907.

*"To amend Act No. 27, 1899, entitled Act to provide for the inspection and examination of cattle arriving in this Colony by sea, and to prevent the introduction of the disease of Tuberculosis."***

1.—*Construction.*—This Act shall be read and construed together with Act No. 27, 1899, hereinafter called the principal Act.

6.—*Inspection and Branding of Slaughter Cattle.*—Any cattle which may have been allowed to land under the 13th Section of the principal shall be inspected and branded with a suitable brand decided upon by the Principal Veterinary Surgeon, and shall be slaughtered within a period of one calendar month from the date of landing in the Colony.

In the case of cattle so imported coming from countries where tuberculosis is known to exist such cattle shall be quarantined until slaughter and their carcasses or any part thereof shall not be removed until they have been passed, as fit for human consumption, by a Government Veterinary Surgeon.

*Referred to in amended Sections 4, 5 and 6.

**I have carried out all the amendments made in the principal Act and it is therefore only necessary to give here Sec. 6.—H.J.C.

If any such cattle are not slaughtered within one month, or within such longer period as may be granted by the Principal Veterinary Surgeon, the owner shall be liable in respect of each animal to a penalty as provided in Section 12 of the principal Act.

VI.—GLANDERS.

[LAW.—ACT 27, 1898.]

Act No. 27 of 1898 obliges owners of animals suspected to be infected with glanders to isolate the animals and within 48 hours report the matter to their neighbours and to the Magistrate, Stock Inspector or Veterinary Surgeon of the District. The diseased animals must not be removed whilst they are under treatment. Destruction of the animals may be ordered by the Veterinary Department. In-contact animals are to be isolated by order of the Veterinary Department. Hotel keepers who knowingly permit the stabling on their premises of any infected animal, or who may discover after stabling, that the animal is infected, and who do not have such stable properly cleaned and purified, are liable to a penalty.

ACT No. 27, 1898.

*“To make better provision for Preventing the Spread of the Disease called Glanders.”**

2.—*Interpretation.*—In this Act the word “animal” includes all animals of the following classes: horse, mule, donkey. “Veterinary Surgeon” or “Stock Inspector,” unless the context shows a different meaning, means a Veterinary Surgeon or Stock Inspector employed in the Department of the Principal Veterinary Surgeon.

3.—*Report of Disease to be made by Stock Owner.*—It shall be the duty of every person being the owner, or having the charge or custody of an animal suspected of being infected with, or showing symptoms of, the disease known as Glanders, to isolate the said animal, and within forty-eight hours of such disease manifesting itself to give information to his immediate neighbour or neighbours, and to the Magistrate, Stock Inspector, or Veterinary Surgeon of his district. Such Magistrate or Inspector of Stock shall at once inform the Veterinary Surgeon of the district, who shall immediately proceed, on receipt of such information, to inspect and examine the case.

*See part vii. of this chapter, Act 16, 1936, in regard to the application of the Glanders Act in certain particulars to Epizootic Lymphangitis.

4.—*Diseased Animal not to be Moved.*—It shall not be lawful for any person to ride, lead, drive, or otherwise conduct any animal infected or suspected of being infected with glanders, or about to be examined or treated for the said disease; but the examination and treatment of any such diseased animal shall take place at or near to the place in which the disease shall have been first discovered, and in which place the animal shall have been isolated.

5.—*Offence of Sending Diseased or Suspected Animal by Rail.*—Any person who shall send, or attempt to send, by railway any animal infected, or which he has reason to suppose is infected, with the disease called glanders, shall be liable to a fine not exceeding Ten Pounds Sterling, or in default of payment to imprisonment, with or without hard labour, for a period not exceeding one month.

6.—*Such Animal not to be sent to the Pound.*—In no case shall any animal infected, or suspected of being infected, with the disease called Glanders be sent to any public pound, but it shall be isolated, together with any or all the other animals until such time as they have been examined by a Veterinary Surgeon on the premises of the owner or person in whose custody they are. Any person, not being an owner, in whose custody and on whose premises the said animals may be so isolated, shall be reimbursed by the owner, and, failing the owner, by the Government, for all necessary expenses he may be put to for feeding, securing, and taking charge of the said animals.

7.—*Offence of Offering Diseased or Suspected Animal for Sale.*—Any person offering for sale, either publicly or privately, any animal infected, or which he has reason to believe may be infected, with Glanders, shall on conviction be liable to a fine not exceeding Fifty Pounds Sterling, and in default of payment to imprisonment for a period not exceeding three months.

8.—*Offence of taking Infected Animal on Roads, Outspans, etc.*—Any unauthorised person, whether the owner or not of any animal infected with glanders, who shall ride, lead, or drive, or otherwise conduct any such animal upon or along any public road, street, or thoroughfare, or into any common pasture land or any outspan place, shall incur, and become liable to, a penalty not exceeding Ten Pounds Sterling, and not less than Five Pounds Sterling, and in default of payment thereof to imprisonment for any period not exceeding one month, unless he shall prove to the satisfaction of the Court before which the case shall be prosecuted that the said animal was, at the time and place charged, in the act of being conducted to some particular adjacent place for the purpose of being destroyed.

9.—*Stray Animal may be Secured for purpose of Inspection.*—It

shall be lawful for any person who shall find any animal infected, or suspected of being infected, with glanders, in or upon any public or private road, street, or thoroughfare, or on common pasture land or outspan place, or running loose upon the place or ground of any person, and not in charge of any person, to secure such animal on the spot, if practicable, otherwise in some other place deemed more suitable by such person, until it can be examined, as provided in the third section of this Act.

10.—*Report, Isolation, and Inspection.*—It shall be lawful for any person who shall have secured any animal, as provided in the last preceding section, to report the same to the Magistrate, or to a Stock Inspector, who will at once inform the Veterinary Surgeon. The said animal shall be kept isolated and fed until the decision of the Veterinary Surgeon shall be known regarding the disposal of such animal.

11.—*Powers of Vet. Surgeon or S.I. to enter Stable to Inspect Animals.*—A Veterinary Surgeon or Stock Inspector shall have full power and authority to enter into any stable, or other building or place in which any animal infected, or suspected of being infected, with glanders is or has been, for the purpose of inspecting any such animal, and if he think proper he may direct any animal to be isolated, with any precautions he may consider necessary.

12.—*Powers of Vet. Surgeon to apply Tests and compel Isolation.*—If, upon inspection of any animal, a Veterinary Surgeon is of opinion that it is infected with Glanders, he shall be empowered to apply a test for the purpose of ascertaining whether it be so infected or not, and he may order such animal to be isolated, and to be submitted for further examination, as he may think proper.

13.—*Vet. may order Destruction of Infected Animal.*—If, upon any examination, a Veterinary Surgeon finds that an animal is infected with Glanders, he shall have full authority to order its destruction, and to enforce the execution of such order.

14.—*Examination of Carcase.*—In the event of any animal being destroyed by order of the Veterinary Surgeon as being infected with glanders, the owner may claim to have the carcase opened and examined in presence of the Veterinary Surgeon and two or more disinterested persons. If the animal is found to have been infected with Glanders, and the disease had openly manifested itself, at the time of the inspection by the Veterinary Surgeon, then no compensation shall be claimable for the destruction of such animal. If the animal was so infected, but the disease did not become manifest until shown by a test applied by the Veterinary Surgeon, then compensation shall be paid out of the general revenue to the extent of two-thirds of the value of such animal:

Provided that such compensation shall in no case exceed Twenty Pounds Sterling. If the animal be proved not to have been infected with

Glanders, then the compensation shall be the value of the animal immediately before it was slaughtered, but shall in no case exceed Thirty Pounds Sterling. The value of the animal so destroyed for which it is intended to claim compensation, shall be decided by two disinterested persons, one of whom shall be appointed by the Veterinary Surgeon, and one by the owner.

Provided also that no compensation shall be claimable by the owner of any animal which has been introduced into this Colony from the neighbouring States or Colonies, or by sea within a period of six months prior to the application of the test as above provided for, and that, if called upon to do so, it shall lie with the person claiming compensation to prove to the satisfaction of the Minister of Agriculture that the animal was introduced prior to the said period of six months.*

15.—*Isolation of "in-contact" Animals.*—The Principal Veterinary Surgeon or other Veterinary Surgeon is hereby empowered to direct the isolation at such places as he may approve of any animals which he shall be satisfied have been in contact with an animal infected with glanders for such period and under such restrictions as he may deem necessary.

16.—*Burning or Burial of Carcases.*—All animals which have died of Glanders, or have been destroyed either by the owner or otherwise, as being infected with Glanders, shall be immediately burned or buried and well covered up by or at the expense of the owner, and at such place or places as may be most convenient: Provided it be not within fifty yards of any dwelling-house, or within fifty yards of any stream: Provided further, that all animals which have died or have been destroyed within the boundaries of any borough or township shall be buried at such place or places as may be fixed by the Corporation of such borough or the Local Board of such township; and any person whose duty it shall be to bury such dead animal, and who shall refuse or neglect to do so, shall be liable, upon conviction, to a fine not exceeding Ten Pounds Sterling, and to have the said animal buried at his expense by order of the Magistrate.

17.—*Liability of Hotelkeepers for Stabling Infected Animals or Neglecting Precautions.*—Any accommodation-house or hotelkeeper who shall knowingly stable, or permit the stabling on his premises of any horse, mule, or other animal which shall be infected with Glanders, or be suspected of being so infected, or who shall, after having stabled such animal, discover that it was so infected, neglect properly to clean and purify such stable and manger therein according to any rules which may be made in terms of this Act, or who shall stable a horse or other animal of any visitor with any animal infected with glanders in the same stable or building, or without previously purifying and disinfecting, to the satis-

*This second proviso was added by Act No. 16, 1899.

faction of the Veterinary Surgeon, such stable and manger, as aforesaid, shall, upon conviction before the Magistrate, be liable to a penalty not exceeding Five Pounds Sterling.

18.—*Destruction of Infected Articles.*—All clothing and utensils, which, in the opinion of a Veterinary Surgeon, are likely to disseminate the disease known as Glanders shall be destroyed or otherwise dealt with as directed by the said Veterinary Surgeon.

19.—*Purification of Stables and Premises.*—All stables and other places in which animals infected with glanders have been stabled or kept shall be dealt with by the Veterinary Department in such manner as to ensure their subsequent freedom from the disease.

20.—*Duty of Persons Keeping Animals to Allow Inspection, etc.*—It shall be the duty of all persons having the charge or custody of animals to allow and facilitate in every way the inspection, testing, and examination of all such animals, and to obey all lawful orders of a Stock Inspector or Veterinary Surgeon, and when so ordered, to destroy any animal, and to bury it promptly and with proper precautions. Any person who shall neglect or refuse to perform his duties under this section shall be guilty of a contravention of this Act, and shall, in addition to any other penalty, be liable to pay all expenses incurred through his neglect or disobedience in carrying out such orders.

21.—*Offence of Knowingly Allowing an Infected or Suspected Animal to Stray.*—If the owner of any animal infected with, or showing the usual symptoms of Glanders, and which shall be found at large and unsecured, as described in Section 9 of this Act, shall be proved to have known or to have been informed that such animal was infected with Glanders, or suspected to be so, and shall have refused or neglected to isolate the said animal, or to act as required by this Act, he shall be guilty of a contravention of this Act.

22.—*Duty of Private Veterinary Surgeons to Report Suspicious Cases.*—It shall be incumbent upon all private Veterinary Surgeons to report to the Principal Veterinary Surgeon of the Colony, or to the nearest Magistrate, Government Veterinary Surgeon, Stock Inspector, or Police Inspector, any case coming under their notice which they may deem to be suspicious, in order that such case may be dealt with by the Veterinary Department without delay, and any such case so reported to a Magistrate or other officer shall be at once brought under the notice of the Principal Veterinary Surgeon.

24.—*Punishment of Contraventions.*—Any person contravening any of the provisions of this Act or any of the rules framed thereunder for which no special penalty is provided, shall be liable to a penalty or fine not exceeding Ten Pounds Sterling, or in default of payment to imprisonment, with or without hard labour, for a term not exceeding one month.

VII.—EPIZOOTIC LYMPHANGITIS.

[Law.—Act 46, 1906]

This Act extends the provisions of the Glanders Act (see preceding section to the disease Epizootic Lymphangitis), with the provision that the Veterinary Department may grant permission to the owner of an in-contact animal to use the animal under certain conditions. In the case of destruction of an animal by order of the Veterinary Surgeon which upon *post-mortem* examination is found not to have been infected with Epizootic Lymphangitis, compensation not exceeding £30 is to be paid for the animal.

ACT No. 46, 1906.

“For preventing the spread of the Disease known as Epizootic Lymphangitis.”

1.—*Application of Glanders Act.*—The provisions of Act No. 27, 1898, entitled Act “To make better provision for preventing the spread of the Disease called Glanders” shall apply to the disease known as Epizootic Lymphangitis in like manner as to Glanders, except so far as they are varied by this Act, and subject to such exceptions the said Act is incorporated with this Act.*

2.—*Open Quarantine of In-contact Animals.*—The following shall, for the purposes of this Act, be added to Section 11 of the Glanders Act, 1898:

The Veterinary Surgeon or Stock Inspector may, in place of ordering an in-contact animal to be isolated, place it in open quarantine, with permission to the owner to use the animal provided that it is stabled nowhere else than at the place directed, and that it shall not be sold or passed into the keeping of any person other than the owner or person then having charge of it. He may also at any time add any other conditions to his order, and may revoke the order and direct the animal to be isolated.

He may also permit treatment to be carried out, if he consider it advisable, in respect of any animal affected with the disease.

3.—*Re Sec. 12 of Glanders Act.*—Section 12 of the Glanders Act of 1898, shall not be incorporated with this Act.

4.—*Compensation for Destruction.*—The following section shall, for the purposes of this Act, be substituted for Section 14 of the Glanders Act of 1898:

* The text of the Glanders Act will be found in Part VI. of this Chapter (Act No. 27, 1898.)

In the event of any animal being destroyed by the order of a Veterinary Surgeon as being infected with Epizootic Lymphangitis the owner may claim to have the carcass examined in the presence of a Veterinary Surgeon and two or more disinterested persons. If the animal is found to have been infected with Epizootic Lymphangitis no compensation shall be paid for its destruction. If the animal be proved not to have been so infected, then compensation shall be paid out of the general revenue, in no case exceeding Thirty Pounds (£30) Sterling. The value of the animal so destroyed for which it is intended to claim compensation, shall be decided by two disinterested persons, one of whom shall be appointed by the Veterinary Surgeon, and one by the owner.

VIII.—SCAB.

[LAWS.—Laws 48, 1887; Act 19 1906.]

Under Law 48, 1887, inspectors of sheep may be appointed, whose duty it will be to inspect each flock in his district at least once every four months. The owners of infected flocks are to be granted their license to keep such sheep for the purpose of cleaning them in the manner prescribed. The license is to be renewed for a further period of two months and the renewal continued at light intervals until such time as they are clean. Every person who becomes possessed of a flock of sheep is to report the fact to the Inspector of his district; he must also register at the Magistrate's office the brand which he proposes using. Unbranded sheep running on Crown lands, native locations or commonages are liable to be impounded. Every owner of sheep which become infected with scab must report the fact to the Inspector. There is a special provision in the law for dealing with infected sheep straying or intermixing with other flocks.

The importation of infected sheep and the movement of sheep across the border, are provided for in Sections 14 to 20.

Act No. 19 of 1906 empowers the Governor to authorise the entry of sheep into Natal from other parts of South Africa.

LAW No. 48, 1887.

"To repeal and re-enact with amendments the Law No. 12, 1882, entitled Law 'To repeal and re-enact with amendments Law No. 26, 1878,' entitled 'Law for the better prevention of the Disease in Sheep called Scab.'"

Short Title: "The Scab Law, 1887."

1.—[Repeal of Law No. 12, 1882.]

2.—*Appointment of Inspectors.*—The Governor in Council may from time to time appoint an Inspector or Inspectors of Sheep for this Colony, or for any district thereof, and may from time to time remove or dismiss such Inspector or Inspectors; and every person so appointed shall have full power at any time to inspect any sheep within this Colony, or the district thereof for which he shall be appointed, wherever such sheep may be kept, driven, or depastured, and shall have, exercise, and discharge within this Colony, or the district thereof for which he shall be appointed, the several powers, authorities, and duties hereinafter mentioned; and if any person shall refuse to allow any Inspector to enter upon his land, pasturage, or premises, or to examine any sheep belonging to him or in his care or possession, or shall attempt to impede or hinder any Inspector from examining such sheep, or shall not when required by any Inspector render him every reasonable assistance, or after demand made by the Inspector, shall fail to collect and produce to him within reasonable time his flock of sheep, such person shall, on conviction before any Resident Magistrate, forfeit and pay any sum not exceeding Ten Pounds for each offence.

3.—*Duties of Inspectors.*—It shall be the duty of each Inspector appointed under this Law to visit each flock in his district at least once in four months. In the event of any flock being declared by such Inspector to be infected with the disease called Scab, the owner of such flock shall be granted a license, conform, as near as may be, to the form of license set forth in the Schedule hereto marked D, to keep such sheep for a period of two months for the purpose of cleaning the same. Every such license shall contain a condition that the sheep thereby licensed shall be properly dipped a certain number of times, the first dipping to be made within twenty days from the date of such license, and the owner shall be required to satisfy the Inspector that every sheep so licensed has been properly dipped as required by the license. At the expiry of such license the Inspector shall re-inspect such flock, and should the same be still infected with Scab, the license may be renewed for a further period of two months, and the Inspector shall repeat his inspection every two months until such flock is found clean. Every renewed license shall contain requirements as to dipping similar to those contained in the first license. The first license shall be given free of charge, for the second a penalty of Three Pounds shall be charged, and for every subsequent renewal of the license a penalty of £5 until the flock is clean. And every owner who shall neglect or refuse to carry out the conditions of any such license shall, on conviction, be liable to a fine not exceeding £5 for the first offence, £10 for the second offence, and £15 for any subsequent offence: Provided, however, that it shall be lawful for the Colonial Veterinary Surgeon to

extend the period for dipping any sheep so licensed, whenever it may appear to him that such dipping at the times required by the license would be dangerous or injurious to such sheep. All payments in respect of renewals of licenses shall be made to the Inspectors for the respective districts, and if not paid within thirty days from the date of any such renewal shall be recoverable by them in the Courts of the Resident Magistrate having jurisdiction in such districts. Any sheep so licensed shall, whenever grazing upon unfenced land be attended by a shepherd, and for every breach of this provision the owner shall, upon conviction, forfeit a sum not exceeding £5.

5.—*Possession of Sheep to be Reported to Inspector.*—It shall be the duty of every person who may be, or may become, possessed of a flock of sheep, to report the circumstance to the Inspector of his district within one month from the date of the commencement of this Law, or within one month from the date of his becoming possessed of a flock of sheep, as the case may be, and at the same time to notify to the Inspector, in writing, the name of his farm and the number and brand of his sheep: Provided, that Native owners may give notice verbally. Any owner neglecting to give such notice, or knowingly make a false return, shall forfeit, on conviction, any sum not exceeding £5.

6.—*Owner of Infected Sheep to give Notice.*—It shall be the duty of every owner of sheep which are or may become infected with the disease called Scab, to give notice in writing at once to the Inspector of his district, and to every occupier of adjoining land who may possess a flock of sheep; and any owner of infected sheep neglecting or delaying to give such notice, shall be liable to a fine not exceeding Twenty-five Pounds. And the Inspector, on receiving such notice, as aforesaid, shall thereupon issue, in manner and form aforesaid, a license to keep the infected sheep for the purpose of cleaning the same.

7.—*Return to be Made to Inspector.*—Every owner of sheep within this Colony shall, whenever thereunto required by a notice in writing to be personally delivered to such owner, or left at his usual or last known place of abode in the said Colony, fill up a printed form in terms of Schedule hereunto annexed, marked A (which shall be supplied to him by the Inspector), containing a correct account of all the sheep in his possession or custody, with the marks and brands of such sheep, and deliver the same, or cause the same to be delivered by post or otherwise to the Inspector. And if any such owner shall not, within thirty days after the delivery or leaving of such notice, deliver such account, he shall forfeit and pay, for every such offence, a sum not exceeding Five Pounds. And any person knowingly giving a false return to the Inspector shall be

fined a sum not less than Two Pounds nor more than Ten Pounds: Provided that with respect to Natives it shall be sufficient that such notice shall be given and account rendered verbally.

8.—*Compulsory Branding.*—Every owner of sheep shall, within one month after becoming possessed of sheep, or after this Law comes into operation, if not already registered, register or cause to be registered at the office of the Resident Magistrate in and for the district in which the sheep are depasturing, a description of the mark or brand which the proprietor of such sheep uses or purposes to use in marking or branding his sheep. Every owner now, or hereafter, of sheep above the age of six months kept or depastured on any land, shall cause all such sheep to be marked or branded with such mark or brand as aforesaid, not less than three inches in length, in a conspicuous way, with pitch, paint, or some suitable composition, and if any two proprietors of sheep have similar brands, the Inspector may require any owner of any such sheep to alter the brand or mark to prevent mistakes and confusion. And every owner who shall refuse or neglect to register or deliver such description in manner aforesaid, or to brand such sheep and keep them conspicuously branded, or to alter the brand when required by the Inspector as aforesaid, shall, on conviction, forfeit and pay a sum not less than Two Pounds nor more than Ten Pounds for every conviction: Provided that there shall be an interval of not less than one month between any two convictions. And it shall be lawful for the Resident Magistrate to refuse to register a brand which shall have been already adopted and registered by or for another sheep-owner: and a duly registered and authorised brand or mark shall constitute *prima facie* evidence of ownership of any sheep for the purpose of this law.

9.—*Impounding of Unbranded Sheep running on certain Lands.*—Every Inspector or flock-master shall be authorised and empowered to impound unbranded sheep found running on any Crown Lands, Native Location, or Commonage, in any case where no one shall be found to claim the same.

The owner of any such impounded sheep who may desire to release them, shall make application to the Resident Magistrate, and shall furnish to him a writing supplied by the poundmaster giving particulars of such sheep, and such Resident Magistrate, upon being satisfied as to the ownership of such sheep, shall impose a sum not exceeding £5 by way of penalty, upon payment whereof he shall make an order for the delivery of such sheep to the owner, who shall be required to pay pound fees therefor before delivery.

10.—*Destruction of Unbranded Infected Sheep Straying or Inter-mixing with other Flocks.*—If any straying or trespassing sheep infected with Scab, which are unbranded, shall be found straying on any private

land, or intermixed with any flock of sheep which are clean within the meaning of this Law, it shall be lawful for the owner of such land or flock, or his authorised agent, upon the authority of the Inspector, or, in the absence of the Inspector, upon the recommendation in writing of two neighbouring sheep-farmers first obtained, to destroy such sheep so infected, provided they do not exceed ten in number; and, in the event of the Inspector not being present, the owner or persons causing such sheep to be destroyed shall forthwith report the fact to the said Inspector, who shall forthwith report the same to the Resident Magistrate of his County or Division. But otherwise, and also in case such sheep shall exceed ten in number, then the owner of the land upon which, or of the flock into which, they have so strayed or intermixed, shall be empowered to at once dip and clean such sheep, and such sheep, after being so cleaned and dipped, shall be sold by auction; the proceeds of such sale, after deducting expenses, to be devoted, first, towards the indemnification for damage done, and payment of the expenses of the owner of the land or of such flock so injured by their trespass, and the overplus, if any there be, to be paid into the Colonial Treasury: Provided that such sale shall not be made without the authority of the Inspector of the district, nor until after fourteen days' notice of such sale has been given in the *Government Gazette*. And provided that such dipping shall not be carried out without the authority of the Inspector, or, in the event of his absence, without the written recommendation of two neighbouring sheep-farmers. All such proceedings taken in the absence of the Inspector shall be reported to the Inspector by the owner or person causing such sheep to be dipped, and the Inspector shall report the same to the Resident Magistrate. And in case such infected sheep are branded, and their owner be known to the owner of the land, or of the flock into which they have strayed or intermixed, then and in that case the owner of such straying or trespassing sheep shall be liable to all the expenses of dipping and cleaning of the flocks infected by their trespassing and intermixing, and for any and all damages and expenses occasioned thereby; such damage to be assessed by two neighbouring sheep-farmers, one to be chosen by each party, these two having power to choose a third as umpire; but should the owner of the diseased sheep refuse or neglect to choose an appraiser, then both shall be chosen by the injured party: Provided that such damages are claimed within three months from the date of trespass: And provided further that notice in writing of such trespass of infected sheep shall be given as soon as possible thereafter to the owner thereof; but if the owner of such trespassing sheep shall not be known to the injured party, notice thereof shall be given by the Resident Magistrate of the County in the *Government Gazette*; and if within one month after the publication of such notice the

sheep shall not be claimed, then it shall be lawful to proceed in the same way as in the case of those found without a brand.

11.—*Meaning of "Infected Flock."*—If in any proceedings under this Law, any one sheep in a flock is proved to be infected with the disease called Scab, all the sheep in such flock shall be deemed and taken to be so infected.

12.—*Movement of Sheep Infected or Dressed for Scab.*—If any sheep which shall be or shall have been infected with or dressed for the said disease within a period of three months, shall, without the authority in writing of an Inspector, be removed from any land upon which they shall have been kept or depastured, and driven upon or along any road, or upon, over, or across any land in this Colony not being in the actual occupation of the owner of such sheep, and such road not being within the boundaries of the land in the actual occupation of such owner as aforesaid, the owner of such sheep shall be liable to pay a penalty of not less than Five Pounds, nor more than Fifty Pounds. And no Inspector shall grant an authority in writing as aforesaid unless he shall have satisfied himself, by personal inspection or otherwise, that such sheep are free from the said disease, or unless the owner shall deliver a declaration to him, previously made and subscribed by such owner before some Justice of the Peace (which declaration such Justice is hereby required to take), that such owner believes the sheep intended to be removed to be then free from disease, and such authority in writing shall remain in force for a period not exceeding ten days: and the Inspector granting such authority in writing shall at once notify in writing to the Inspector into whose district the sheep may be removed the fact of his having granted such authority in writing.

13.—*Sheep may be Sold under Certain Conditions.*—If any person against whom any proceedings may be taken under this Law as the owner of any sheep shall deny that he is the proprietor thereof, or that he has any right, title, or interest in such sheep, or if it shall be uncertain who is the proprietor of any sheep in respect of which any proceedings for the recovery of a penalty may have been instituted under this Law, or if the person against whom any owner of any sheep and against whom any order for the payment of any penalty has been made, shall not within three days after the making of such order pay the amount so awarded against him together with the costs, then and in any such case any Resident Magistrate may make an order for the sale of such sheep or so many of them as may appear to be necessary in respect of which such penalty has been imposed; and such penalty and the costs attending the recovery thereof shall be paid out of the proceeds of such sale, and the surplus, if any, shall be paid to the proprietor of such sheep if claimed within three months from the day of such sale; but if not claimed, it shall be paid into

the Colonial Treasury. But no such order as last aforesaid shall affect or alter the liability of any owner who may be convicted under the provisions of this Law.

14.—*Penalty for Importation or Introduction of Infected Sheep except in Compliance with Law.*—Any person who shall import or introduce by land into this Colony, save as is hereinafter provided for in this Law, any sheep, and shall cause or suffer it or them to leave the port where landed in this Colony, or the station at which they were introduced, over the boundary into this Colony, at any place other than those defined by this Law and by the regulations to be made thereunder shall, upon conviction, forfeit any sum not exceeding Fifty Pounds.*

[This Section applies to all sheep except those imported by sea or exempted by Sec. 20 of this Law.—Act No. 19, 1906.]

15.—*Establishment of Dipping Stations.*—There shall be established at Van Reenen's Pass, on the Drakensberg; De Jager's Drift, on the Buffalo River; and Hancock's Drift, on the Umzimkulu River, and at such other places as the Governor in Council may, in his discretion, see fit to appoint, ports of entry for sheep imported into this Colony, and at each such port of entry there shall be a dipping tank or tanks, together with the necessary appliances, for the dipping of all sheep for which permission in terms of Schedule B hereunto annexed, to cross the boundary hereinbefore mentioned shall be requested.**

16.—*Appointment of Inspectors at Crossing Places.*—It shall be lawful for the Governor in Council from time to time to appoint an Inspector or Inspectors, who shall reside at any crossing places which may be hereafter fixed upon, and who shall carry out the provisions of this Law as regards all sheep travelling across the boundary at the places of crossing aforesaid, and shall perform such other duties as may from time to time be assigned to him or them by the Governor in Council. The said Inspector so appointed may from time to time be dismissed by the Governor in Council. Any person who shall in any way impede or hinder any such Inspector or Inspectors from examining such sheep, or from branding or dipping the same, or who shall not, when required by any such Inspector, render every reasonable assistance, shall be liable to the same penalty as is fixed for a contravention of the Second Section of this Law.

* As amended by Sec. 3 of Act 19, 1906.

** This Section has been amended by Act No. 21, 1895, which enacts that:—
 “Whenever it shall appear to the Governor-in-Council advisable in the public interests, on the occasion of any approaching Agricultural Show, Exhibition, or the like, to be held either in this Colony or elsewhere in South Africa, the said Governor-in-Council may relax the provisions of Law No. 48 1887, in so far as they require the dipping of sheep imported or brought into this Colony and may order and determine that the said Law shall to that extent be suspended, and the requirement of dipping sheep on being imported or brought into this Colony dispensed with in such manner and for such period and for such purposes and under such conditions and precautions as may appear advisable, and may be directed by the said Governor-in-Council.”

17.—*Inspectors may Brand and Dip Sheep.*—Upon application made by an owner of sheep for that purpose, it shall be the duty of the Inspectors to cause the sheep in respect of which such application shall have been made, to be branded with the registered mark of the owner, and also with a Government brand, and to be properly dipped in the dipping tank or tanks established under the Fifteenth Section hereof; and it shall be lawful for the Inspectors to charge for such branding and dipping, fees at the rate of not less than One Penny nor exceeding One Penny-halfpenny per head for every sheep so branded and dipped.*

18.—*Branded and Dipped Sheep not to Leave Station without Permit.*—Whenever such sheep as aforesaid shall have been branded and dipped, they shall not be permitted to leave any such dipping station without a permit having been issued, in terms of Schedule B hereunto annexed, by the Inspector. And each Inspector granting such permit shall at once advise the Inspector of the district to which any such sheep are travelling of the granting of such permit. Such permit shall endure for ten days, to enable the sheep to reach their destination, and such sheep shall from that time be under the supervision of the Inspector of the district, who shall thereupon issue to the owner or person in charge of the sheep a certificate as in Schedule C hereunto annexed, and the said sheep shall thereafter be deemed to have been legally brought into the district.

19.—*Sheep Arriving from Over the Border to be Dipped.*—All sheep brought into this Colony over its borders shall upon arrival at their destination be dipped once, if certified by the Inspector of that district as free from Scab; if otherwise, they shall be twice dipped, in manner as provided in Section 3; the first dipping to be made as soon as possible, and the second dipping within twenty days thereafter. Any breach of this clause shall be punishable by a fine of not less than £5 and not exceeding £20 for each offence.

[Notwithstanding the provisions of this Section, "it shall be lawful for the Governor to authorise the entry of sheep into this Colony from all or any of the Colonies of South Africa without the necessity of dipping such sheep, subject to such conditions as may be contained in regulations to be made by the Governor in that behalf. Any such authority may at any time be suspended or revoked by the Governor."—Sec. 1, Act No. 19, 1906.]

20.—*Special Provision for Winter Movement of Sheep in Klip River County.*—Any flockmaster, being the owner or the lessee of land situate

* As amended by Law No. 9, 1893.

in the County of Klip River may bring his flock or flocks across the border into this county once during each year for the necessary pasturing of his flock or flocks on land situate in the said county during the winter months, without being obliged to enter the Colony at any port of entry or to comply with the compulsory dipping insisted upon on that occasion under this Law:

Provided, however, that in all such cases the owner shall have obtained, and shall produce for inspection whenever required, a certificate signed by the Government Stock Inspector of the district from which he is bringing his sheep into Natal, showing that the flock has been personally inspected not more than ten days previous to the arrival of the sheep at the Natal Border, and that the sheep are free from Scab.*

[And] Provided, that if such sheep shall be found by the Inspector. after their arrival at their grazing ground, to be scabby, the flockmaster introducing such sheep shall be liable to a penalty of not less than £5 nor more than £50. That in all other respects such flockmaster shall comply with all other provisions of this Law, and he shall not be allowed to remove such flock or flocks to any other part of this Colony without special permission, for that purpose first had and obtained, from the Inspector of his district.

21.—*Dipping to be to Satisfaction of Inspector.*—The dipping provided for under this Law shall be to the satisfaction of the Inspector for the district in which the dipping takes place.

22.—*Private Marks on Sheep.*—Nothing in this Law contained shall prevent any owner of sheep, over and above the brand required by this Law, from cutting his private mark in the ears of his sheep: Provided, that it shall not be lawful to cut (stump) through either one or both of the ears in such a way as would obliterate the private mark of the owner, under a penalty not exceeding Ten Pounds for each sheep so unlawfully maimed or cut in the ears, and the forfeiture of the sheep to the informant or to the owner thereof, if they shall appear to have been stolen or to belong to another person. Every such ear-mark shall be registered at the office of the Resident Magistrate of the district.

25.—*One or more Sheep to constitute a Flock.*—For the purposes of this Law, one or more sheep kept on the same farm shall constitute a flock.

* This proviso was added by Act No. 19, 1906. The second proviso is as it stood in the original Law.

*Schedule A.**

RETURN FOR SHEEP INSPECTION FOR MONTH.

Owner's Name.	Farm or Farms.	Number of Sheep.	Clean Sheep.	Sheep affected with Scab.	Mark or Brand.

Schedule B. †

No.
Permit used

18

I certify that _____, have been inspected and dipped, and are at liberty
to be driven on the Public Road from _____
Brand _____
Earmark _____

This permit is in force for ten days.

Inspector.

Schedule C. §

(No.)

Date

18

I certify that _____, have been imported into the Colony from _____
in the manner provided by Law, and are to be driven to and left at _____
Inspector. _____ District _____

Schedule D.

LICENSE UNDER THE SCAB LAW, 1887.

I certify that _____, No. _____
on farm _____, in Ward No. _____, County of _____
are affected with Scab, and I hereby grant to the said _____
license to keep the same for two months from date in order to clean them.

The said _____ is hereby required to have the said Sheep
dipped twice; the first dipping to be made within twenty days from this date; the
second dipping fourteen days later.

Dated this

day of

18

Ward

Sheep Inspector,
County of _____

*Referred to in Sec. 7.

† Referred to in Sections 15 and 18.

§ Referred to in Sec. 18.

I hereby certify that the whole of the above flock of Sheep have been dipped on the dates herein set forth :—

	First Dipping.	Second Dipping.
Commenced	Date,	Date,
Completed		

Date]
 Residing at..... Owner,
 County of.....

ACT No. 19, 1906.

"To Amend the Scab Law, 1887."

1.—*Authority for Entry of Sheep without Dipping.*—Notwithstanding the provisions of Section 19 of the Scab Law, 1887, it shall be lawful for the Governor to authorise the entry of sheep into this Colony from all or any of the other Colonies in South Africa without the necessity of dipping such sheep, subject to such conditions as may be contained in regulations to be made by the Governor in that behalf. Any such authority may at any time be suspended or revoked by the Governor.

2.—[Amendment of Sec. 20 of Scab Law—which has been made accordingly.]

3.—[Amendment of Sec. 14 of Scab Law—which has been made.]

4.—*Regulations.*—The Governor in Council may from time to time make regulations dealing with any matters necessary for the proper carrying out of this Act.

IX.—RABIES.

[Law. —Act 29, 1903.]

In making provision for preventing the spread of rabies in dogs, Act No. 29 of 1903 makes it lawful for any person to destroy any dog showing open symptoms of rabies. This applies also to other animals besides dogs which may be liable to the disease. This Act also contains provision for the compulsory muzzling of dogs in public thoroughfares during any period which the Governor may direct. This does not, however, apply to dogs during such time as they are being used for sporting purposes or for the herding of sheep and cattle, so long as they are in charge of a European. Unmuzzled dogs, with the exceptions named, are liable to be destroyed during the currency of such muzzling order.

ACT No. 29, 1903.

"To make provision for preventing the spread of Rabies in Dogs."

Short Title: "The Rabies Act, 1903."

2.—*Destruction of Rabid Dogs.*—It shall be lawful for any person to destroy any dogs showing open symptoms of Rabies, or which is known or reasonably believed to have been bitten by a rabid dog or other rabid animal.

3.—*Powers of Authorised Persons to Order Destruction.*—Any Veterinary Surgeon, or Police Constable, or any person having authority in that behalf from the Principal Veterinary Surgeon, may destroy, or order and enforce the destruction of any dog which he may believe to be dangerous, upon evidence to his satisfaction that such dog has been in contact with a rabid dog or other rabid animal.

4.—*Liability not Affected by Wilful Destruction.*—Nothing in this Act shall be deemed to affect the liability of any person who destroys a dog wilfully or without reasonable grounds as required by this Act.

5.—*Application to other Animals.*—Any reference in the foregoing sections of this Act to dogs shall apply also to any other animal liable to the disease of Rabies.

6.—*Orders as to Muzzling.*—The Governor may at any time by notice in the *Natal Government Gazette*, order that no dog shall be allowed to be in any street or road, or anywhere except upon private premises unless it is muzzled. Such order shall state the period for which it is to be in force; and may be made for the whole Colony, or any part of it, or any town or place specially mentioned: Provided that dogs being used for sporting purposes or for the herding of sheep or cattle, shall, if under the control of a person of European descent during the time they are actually used for such purpose, be exempt from such clauses of the Regulations as may refer to the muzzling of dogs.

7.—*Definitions.*—The expression "muzzled," as used in this Act, means wearing a muzzle of a pattern approved by the Government, and securely fastened so as to admit of the dog breathing and drinking without obstruction. "Unmuzzled" means not muzzled according to the requirements of this section.

8.—*Destruction of Unmuzzled Dogs during Currency of Order.*—Any dog which during the currency of an order made under this Act is found unmuzzled in any street or road, or anywhere, except on private premises, may be taken and destroyed by any Police Constable, or by or under orders of any Magistrate, Police Officer, or officer of the Veterinary Department.

9.—*Regulations*.—The Governor in Council may from time to time make regulations for any of the purposes necessary for the proper carrying out of this Act.

10.—*Offences and Penalties*.—Any person contravening a regulation made under this Act, or knowingly allowing an unmuzzled dog to be away from private premises during the currency of a muzzling order, shall be liable to a fine not exceeding £10 Sterling.

X.—LOCUSTS.

[LAW.—Act 40, 1904.]

Act No. 40 of 1904 makes general provisions for the destruction of locusts. Regulations may be made from time to time for giving effect to this Act. Any portion of the Province may be declared a locust area, and occupiers and owners of land therein may be ordered to assist in the extermination of the locusts, failing which, the Chief Locust Officer may cause the lands of such person to be cleared of locusts and recover any expenses occurred from the owner or occupier. The wilful driving of locusts off any property on to any neighbouring property is liable to punishment by a fine of £50. The ingredients and appliances for use in connection with locust destruction are to be carried free of charge by the railway.

ACT No. 40, 1904.

"To provide for the Extermination of Locusts."

Short Title: "The Locust Extermination Act, 1904."

2.—(Act No. 33, 1895, Act No. 30, 1898, and Act No. 42, 1901, repealed.)

3.—*Definitions*.—In this Act:—

"Minister" means the Minister charged with the administration of this Act.

"Person" includes a firm, company, society or corporation.

"Locusts" mean the insects called respectively "*Acridium pupuriferam*" and "*Pachytylus migratorius*," while in the stage known as Hoppers or Voetgangers.

"Owner" includes the person holding land under lease from the Crown, and the purchaser of Crown Lands not yet transferred.

"Owner or occupier" includes joint owners or occupiers, and the agent or manager of an owner or occupier.

"Land" includes all Crown Lands, Native Locations and lands of the Natal Native Trust.

"Farm" means any rural property, inclusive of Crown Lands and lands of the Natal Native Trust, and applies to Europeans, Natives, Indians, and others.

"Officer" means any officer appointed under the provisions of this Act or of the regulations.

4.—*Rules.*—The Governor in Council may make and alter regulations. The Governor may make and enforce all such orders as may be necessary.

5.—*Officers.*—The Governor in Council may from time to time appoint a Chief Locust Officer and such other officers as may be required to carry out this Act, and may delegate to him or them such of the powers and authority hereby conferred on the Governor as he may think proper.

6.—*Proclamation of Locust Area.*—The Governor may, from time to time, by Proclamation, declare any portion of the Colony to be a locust area, within the meaning of this Act.

7.—*Occupiers and Owners may be Ordered to Assist.*—The Governor may at any time order the occupiers of land in any locust area, and, in the case of unoccupied lands, the owners thereof, whether Europeans, Natives, Indians, or others, to concur in such steps and to take such action as he may order for exterminating locusts upon the lands so owned or occupied.

8.—*Chief Locust Officer's Powers.*—When any such order shall have been made by the Governor, the Chief Locust Officer shall have authority to carry out the same, and to make, issue, and cause to be served upon the persons affected thereby all orders and notices required for giving effect thereto. When any person upon whom an order or notice is required to be served is absent from the Colony or cannot be found, service may be made upon any known agent.

9.—*Failure to Comply with Orders.*—If any occupier of land, or the owner, as the case may be, or his agent, shall fail to forthwith comply with the directions contained in any order for the destruction of locusts, duly made and served upon him, the Chief Locust Officer may, by direction of the Minister, authorise any officer to enter, with such assistance as he may require, upon the lands of such person at all reasonable times and to carry out such orders. Any costs and expenses incurred in or about the carrying out of such order may be recovered by the Chief Locust Officer from the owner or occupier as the case may be. Nothing done under this section shall be deemed to relieve an owner or occupier or any other person from any prosecution or penalty to which he would otherwise be liable.

10.—*Cutting of Grass and Brushwood.*—Any officer, and any person acting in aid or under the authority of such officer, may from time to time, upon such notice as may be prescribed by the regulations, enter into and upon the land of any person and may cut grass and take brushwood thereon or therefrom, and do all other things necessary for the purpose of carrying out the objects of this Act.

11.—*Government and Governor not to be Liable.*—The Government shall not be liable, nor shall the Governor be personally liable, for any loss or damage arising from, or caused by anything done under the authority of this Act.

12.—*Officers not Trespassers and not Liable.*—The Chief Locust Officer and any officer or other person lawfully acting under the authority of the Minister or of an officer in the execution of this Act or the Regulations, shall not be deemed to be a trespasser by reason of entry upon any land, or liable for any damages occasioned by any act done under such authority or in the execution of his duty.

13.—*Plea in Prosecutions.*—If any person is sued or prosecuted for anything done by him in pursuance or execution, or intended execution of this Act, or of any regulation or order made thereunder, he may plead generally that the same was done in pursuance or execution, or intended execution of this Act, or of the regulations or order made under authority of this Act, and may give the special matter in evidence.

14.—*Offences.*—Where any matter or thing is by this Act, or by any regulation, order, or notice under the authority hereof, directed or forbidden to be done, or where any authority is given by this Act to any person to direct any matter or thing to be done or to forbid any matter or thing to be done, and such Act so directed to be done remains undone, or such Act so forbidden to be done is done, in every such case every person offending against such direction or prohibition shall be deemed guilty of an offence against this Act.

15.—*Punishment for Driving Locusts to Other Property.*—Any person who shall wilfully drive, or be a party to the wilful driving of locusts off any property on to any neighbouring property, shall be liable upon conviction to a fine not exceeding Fifty Pounds Sterling, or, as an alternative, to imprisonment, with or without hard labour, for any term not exceeding six months.

16.—*Punishment of Offences under this Act.*—Every person guilty of an offence against this Act or any regulations passed thereunder, shall, except as otherwise specially provided, be liable to a penalty not exceeding Twenty Pounds Sterling, and, in default of payment thereof, shall be imprisoned, with or without hard labour, for any period not exceeding three months.

17.—*Enforcement of Penalty.*—The enforcement of any penalty may be either by prosecution or by a civil suit at the instance of the Chief Locust Officer, who shall have the discretion of demanding, accepting or suing for the whole or any part of such penalty.

18.—*Legal Proceedings.*—All prosecutions or suits for penalties under this Act or the regulations shall be cognisable in the Court of the Magistrate of the Division in which such offence shall have been committed or in which the offender may be found.

19.—*Ingredients, etc., Carried Free by Railway.*—All ingredients, mechanical and other appliances, used in the destruction of locusts and the carrying out of this Act shall be carried free of charge over the Natal Government Railways.

XI.—NOXIOUS PLANTS.

[LAWS.—Law 38, 1874 ; Act 20, 1901 ; Act 12, 1904.]

Law No. 38 of 1874 was framed to make provision for preventing the spread of the burr weed *Xanthium spinosum*, but the provisions of this law were extended by Acts No. 20 of 1901 and No. 12 of 1904 to *Xanthium strumarium* and *Cnicus diacantha*. The principal law provides a penalty for the allowing of burr weed to grow and bear seed. In the case of unoccupied lands, or if, after the occupier has paid the penalty referred to above the weed is still found growing, the Magistrate of the Division is empowered to cause the weed to be destroyed at the expense, in the first instance, of the public Treasury, the amount of such expenses to be eventually recoverable from the owner of the land. Municipalities are liable to double penalty. In the case of public lands outside municipalities the Magistrate of the Division is required to cause the weed to be destroyed at public expense. Road Inspectors and Overseers are required to destroy the weed within 100 yards of public roads.

LAW NO. 38, 1874.

“To repeal and re-enact with amendments Law No. 20, 1861, entitled Law ‘To prevent the spread of the growth of the *Xanthium Spinosum*, Burr Weed.’”*

1.—[Repeal of Law No. 20, 1861.]

*See Acts Nos. 20, 1901, and 12, 1904, *post* which make the provisions of this law applicable to the Weeds, *Xanthium Strumarium* and *Cnicus diacantha* respectively.

2.—*Penalty for leaving Burr Weed Growing.*—From and after the date on which this Law shall come into operation, all occupiers of private land being persons of European descent, or in default of occupation by Europeans, all Natives or other coloured persons, whether they be tenants or squatters, residing upon any such land upon which the *Xanthium Spinosum*, Burr Weed, shall be found growing and bearing seed shall, on conviction before any Resident Magistrate having jurisdiction, be liable to a penalty not less than Twenty Shillings, and not exceeding Five Pounds Sterling: Provided that whenever land is occupied both by Europeans and Natives or other coloured persons, the penalty herein alluded to may be inflicted on both or either of them, in respect of the portions of land occupied by them respectively or conjointly: And provided also that such prosecution may be renewed, and the penalties again imposed, at intervals of not less than six months.

3.—*Magistrates may in certain cases Employ Labourers to Destroy the Weed.*—If the said weed be found growing on any private land which is not occupied, or which may be occupied by servants only, or if occupied, as provided in the foregoing Clause 2, the weed shall be still found growing after the owner or occupier shall have been convicted and fined a second time, or after having a second time tendered and paid the minimum fine required by this Law, it shall be lawful for the Resident Magistrate of the Division in which such land is situated, to employ such number of persons as he may deem necessary for the purpose of destroying it, and the expenses incurred therein shall, in the first instance, be defrayed from the Public Treasury, and are hereby made chargeable upon such land, and the same shall be paid, together with interest at the rate of 6 per centum per annum before any transfer or mortgage of such land be passed before the Registrar of Deeds: and the Resident Magistrate is hereby required and directed forthwith to furnish the Registrar of Deeds with a statement of all charges incurred under this Law upon each property respectively, in order that the same may be recovered by him at the time of transfer or mortgage.

4.—*Nearest Kraal Liable to Penalty in Locations and on Crown Lands.*—If the weed be found growing and bearing seed within the limits of any Native Location, or upon Crown Lands occupied by Natives, the inhabitants of the nearest kraal, or any of them, shall be liable to the penalties provided in Clause 2 of this Law.

5.—*Double Penalty when found Growing on Municipal Lands.*—Whenever the said weed shall be found growing on Municipal Lands, the Mayor and Council of the Borough within the limits of which it shall be found, will be liable to double the penalty by the Second Section provided, and the same may be eradicated and destroyed by the Clerk of the Peace within such Borough, who is hereby authorised to engage labourers for

that purpose, and to defray the expense from the Public Treasury, and to recover double the amount of such expense incurred from the said Mayor and Council, and pay the same when recovered into the Public Treasury.

6.—*Magistrate to cause the Weeds to be Eradicated on Crown Lands, etc.*—Should the said weed be found growing upon any unoccupied Crown Lands, or upon any public outspan place, or in any public road, or any town lands or commonage, not within any municipality, it shall be lawful for the Resident Magistrate of the County or Division, and he is hereby required to employ convict labour, or to engage free labourers, and cause such weed to be eradicated and destroyed, and all expenses necessarily incurred in the destruction of the said weed shall be defrayed from the Public Treasury.

7.—*Colonial Secretary to Publish a Notice in August instructing Fieldcornets to Warn all Persons.*—On the passing of this Law, and in the month of August in every year, the Colonial Secretary shall cause a notice to be published in the *Government Gazette*, instructing Fieldcornets and Constables to warn all persons against any infringement of the provisions of this Law, and the Resident Magistrate of every County or Division shall cause a similar notice to be posted at the door of his office.

8.—*Fieldcornets and Others Required to Inform the Magistrate where the Weed is Growing.*—Every Fieldcornet, Policeman, Constable, or Native Copstable, is hereby required to give information to the Resident Magistrate of his Division or County of any occupier, or, in default of occupation, of any owner, upon whose land the said *Xanthium spinosum* shall be found growing.

9.—*Magistrate may Engage Labourers to Destroy the Weed on Private Lands.*—In addition to any penalties inflicted under this Law, it shall be lawful for the Resident Magistrate, or any person or persons appointed or engaged by him, to enter upon any private lands within his County or Division upon which the said weed may be found growing and bearing seed, and to engage labourers at the charge of the occupier or owner for the purpose of eradicating and destroying the said weed growing thereon, and all expenses necessarily incurred therein shall be defrayed from the public Treasury in the first instance, and be recoverable from the owner or occupier as aforesaid in the Court of the Resident Magistrate, at the suit of the Clerk of the Peace, or other officer acting as such.

10.—*Road Inspectors and Overseers to Destroy the Weed within 100 Yards of the Road.*—Every Road Inspector or Overseer of Road Parties employed by the Government is hereby required and directed to cause the working parties under his direction to eradicate and destroy all plants of the said weed growing upon or within one hundred yards of any road upon which the said party is at work, or along which it may be travelling.

11.—*Governor may Appoint Inspectors in each County during the Summer Season.*—The Lieutenant-Governor may, from time to time, when it shall appear to him to be necessary to enforce the execution of this Law, appoint one or more persons in each County as Inspectors, temporarily, during the summer season each year, who shall be paid at the rate of ten shillings per day, exclusive of travelling expenses, whose duty it shall be to inspect all such localities where they may have been informed, or may have reason to suspect, that the *Xanthium spinosum* is growing; and for that purpose the said Inspectors shall have free access to all such lands or premises during the daytime; and, finding the said weed there growing and in seed, the said Inspectors shall forthwith make a report thereof to the Clerk of the Peace, unless the minimum fine required by this Law shall be tendered, in which case the said Inspectors shall receive the fine, and pass a receipt for the same, and at the end of each month the said Inspectors shall account for and pay over to the Resident Magistrate of such County all such fines, to be by him accounted for to the Treasurer-General, specifying in each case the name of the party from whom each fine was received, the date when received, and the amount; and also describing the land or locality where the weed was found growing.

12.—*Inspectors to Make Monthly Reports.*—The said Inspectors shall also, on the first day of every month during the time that they shall be employed, send in a Report to the Resident Magistrate of the County, setting forth the number of days they have travelled, the places or localities inspected, where and to what extent the weed was found growing, by whom the land is occupied, and the probable amount that would have to be expended to eradicate and destroy the said weed in each case.

13.—*Unpaid Penalties.*—All penalties imposed under this Law may, unless paid within ten days, be levied by warrant of distress and sale of the goods and chattels of the offender.

16.—*Interpretation Clause.*—In the construction of this Law the words “occupier” and “owner” shall, unless otherwise specially defined, be deemed to include Kafirs, Coolies, and any other persons *bona fide* resident on such lands, not being servants in the employ of such owner or occupier.

ACT NO. 20, 1901.

“To include the *Xanthium Strumarium* Burr Weed in the *Xanthium Spinosum* Law No. 38, 1874.

1.—The provision of the *Xanthium Spinosum* Law 38 of 1874 shall apply as fully and effectually to the *Xanthium strumarium* burr weed as though such weed had been originally included in the said law, together with the *Xanthium spinosum* burr weed.

ACT No. 12, 1904.

"To amend, and extend, the provisions of the Xanthium Spinosum Law of 1874."

1.—*The Scotch Thistle.*—The provisions of the Xanthium Spinosum Law No. 38, 1874, shall apply to the thistle known as *Cnicus diacantha*.

2.—*Appointment and Jurisdiction of Officers.*—The Governor may appoint such officers as may be required for carrying out the provisions of Law No. 38, 1874, and such officers shall perform the duties and exercise the authority given by the said law to Magistrates in other than judicial matters, and to inspectors without limitation as to the summer or other season.

3.—*Construction of Law.*—Law No. 38, 1874, Act No. 20, 1901, and this Act shall be construed together as one Act.

XII.—PLANT DISEASES AND PESTS.

[Law. —Act 45, 1904.]

This Act enables the Governor to prohibit, from time to time, the introduction of any plant into Natal likely to introduce disease. The destruction of plants in nurseries affected with any specified disease may be destroyed by order of the Governor, or isolated as may be directed. All nurseries have to be registered at the beginning of each year. The owners of nurseries are also required to provide fumigation chambers. The sale of any plant is deemed to be a guarantee in itself that the plant is free from disease. Plants affected with disease that are being imported into Natal are liable to seizure, and to destruction if the disease cannot be satisfactorily eradicated. The same applies to plants in transit or exposed for sale. Compensation is provided for destruction of healthy plants only. The diseases referred to in this Act will be found in the schedule to the Act.

ACT No. 45, 1904.

"To prevent the Introduction and Spread of Disease in Plants."

Short Title: "The Plants Diseases Act, 1904."

2.—[Law No. 15, 1881, repealed.]

3.—*Definition.*—In this Act:—

“Plant” means any tree, shrub, or vegetation, and the fruit, leaves, cuttings, bark, and any part or product thereof whatsoever, whether severed or attached.

"Disease" means any of the insect pests or plant diseases mentioned in the Schedule of this Act, and any insect pest or plant disease which the Governor in Council may by proclamation declare to be a pest or disease within the meaning of this Act.

"Diseased" means affected with such disease; and

"Healthy" means not so affected.

"Nursery" means any land or premises whereon are grown any plants intended for sale or distribution for the purpose of being grown elsewhere.

"Orchard" shall mean any land or premises where are grown and cultivated any fruit-bearing plants or trees, and extends to and includes a garden or vinery.

"Minister" means the Minister of Agriculture.

"Board" means the Honorary Board of Advice.

4.—*Inspectors*.—The Minister may from time to time appoint Inspectors and other officers necessary for the carrying out of this Act.

5.—*Board of Advice*.—The Minister may, from time to time, appoint an Honorary Board of Advice.

6.—*Introduction of Plants*.—The Governor may from time to time, by Proclamation, prohibit the introduction into Natal of any plant which may be considered likely to introduce any disease. Such Proclamation may either be absolute or subject to such conditions or exceptions as may seem proper, and may apply to the introduction of plants either generally or from any specified place.

7.—*Destruction of Plants*.—The Governor may from time to time, by Proclamation, on the advice of the Board, order that all plants in nurseries throughout the Colony which may be affected with any specified disease shall be destroyed, or that they shall be isolated and treated in any specified manner.

8.—*Rules*.—The Governor in Council may from time to time make and alter regulations for all purposes necessary for carrying out this Act, and for giving full effect thereto.

9.—*Registration*.—Every nursery shall be registered by the occupier thereof at the office of the Magistrate of the Division on or before the 31st day of January in each year.

10.—*Inspection*.—An Inspector may at all reasonable times enter a nursery or orchard, with his assistants, for the purpose of making an inspection or carrying out any other duties therein.

11.—*Measures for Eradication of Disease*.—The Minister may, on the advice of the Board, make an order requiring the occupier of a nursery or orchard to take, within a specified time, all such measures for the

eradication of diseases as may be prescribed in the order. The Minister may in like manner make an order placing any nursery or orchard under quarantine.

12.—*Quarantine*.—So long as an order of quarantine applies to a nursery or orchard, it shall not be lawful to remove any plant or any part or product of a plant therefrom, except with the permission and under the direction of an Inspector, and the occupier shall comply with all instructions contained in the regulations or specially prescribed by an Inspector, with the approval of the Minister, for eradicating or preventing the spread of the disease.

13.—*Fumigation*.—The occupier of every nursery shall provide proper and approved chambers for fumigating with hydrocyanic acid gas, and it shall be his duty to fumigate all plants immediately before delivery in accordance with the regulations.

14.—*Diseased Plants*.—No person shall send out from a nursery any plant affected with disease. If any plant is so sent out, the occupier of the nursery, as well as every person actually ordering or superintending the sending out of such plants, shall be deemed guilty of a contravention of this Act.

15. *Sale of Plants*.—Every nurseryman selling plants shall be deemed to have warranted the same as being free from disease, and he shall not be entitled to receive or recover payment for any plant which may be so diseased: Provided that no defence or claim for the restitution of price, other than such as would be maintainable if this Act had not been passed, shall be competent to a purchaser unless he shall show that he gave written notice of such disease to the vendor or his agent, either delivered personally or by telegram, or sent by registered post within three days next after the day on which the plants actually reached the purchaser.

16.—*Treatment, etc., of Plants*.—When any disease considered by the Minister, on the recommendation of the Board, to be a source of danger is prevalent in any nursery, orchard, or fruit garden he may, if he deems such measure necessary in order to prevent its spread, order the special treatment and, if necessary, the destruction of any specified kinds of plants therein, whether such plants be diseased or not: Provided that compensation shall be paid for healthy plants so destroyed. The amount of compensation shall be fixed as provided for in this Act.

17.—*Powers of Inspectors*.—Any Inspector appointed under this Act or any officer of the Customs may seize any plant which is being imported into the Colony and which is suspected of being affected with disease; and any Inspector may inspect the same and require it to be disinfected to his satisfaction, and if he is satisfied that it is diseased, and that the disease cannot otherwise be satisfactorily eradicated, he may have the

plant destroyed, together with any box, basket or package in which it has been packed. An Inspector may similarly seize and deal with any plant which may be found in transit or exposed for sale in the Colony or which is being sent out from a nursery, and appears to be diseased.

18.—*Compensation*.—No person shall be entitled to receive any compensation whatever for the destruction of plants ordered to be destroyed on account of disease, except that where healthy plants are ordered to be destroyed as a measure of precaution, the owner shall be entitled to receive payment of their value from the public revenue. Such value shall, unless agreed, be assessed by two persons chosen by the Inspector and the owner respectively, and, failing agreement between them, it shall be determined by the award of a competent person mutually chosen by the assessors.

19.—*Trespass*.—No Inspector and no person acting under the direction or order of such Inspector shall be deemed to be a trespasser by reason of any entry or destruction under this Act or be liable for any damages occasioned by carrying out the provisions of this Act unless the same were occasioned maliciously and without reasonable cause.

20.—*Obedience of Orders*.—Every owner of plants, nurseryman, or occupier of premises, and every person representing him, or having charge of any plants or premises under him, shall be bound to obey all lawful orders made by the Minister or by an Inspector, and shall give the Inspector every assistance in carrying out such order, or shall himself carry it out if so required.

21.—*Obligations*.—Any obligation placed by this Act upon the occupier of a nursery or other land shall in his absence or default, or if there be any doubt as to who is to be considered as the occupier, be equally binding upon every person having charge or superintendence of such nursery or land.

22.—*Offences*.—Every person shall be guilty of a contravention of this Act who:—

(a) In any manner obstructs or impedes any person in the execution of any of the powers conferred by this Act or refuses any assistance which he is required to give; or

(b) Disobeys or neglects to comply with any of the provisions of this Act or the terms of any regulation, order, or proclamation made thereunder.

23.—*Penalty*.—All persons contravening this Act, or any regulation or lawful order thereunder, shall for each offence be liable to a penalty not exceeding Twenty Pounds (£20) Sterling, to be recovered in the Court of a Magistrate by the Clerk of the Peace or by an Inspector or other proper officer of the department.

SCHEDULE.*

Insect Pests.

Codling moth (*Carpocapsa pomonella*).
San Jose Scale (*Aspidiotus perniciosus*).
Pear Slug (*Selandria cerasi*).
Cape Fruit Fly (*Ceratitis capitata*).
Apple Mussel Scale (*Mytilaspis pomorum*).
Orange Mussel Scale (*Chionaspis citri*).
Parlatoria of the orange (*Parlatoria ziziphus* and *Parlatoria Pergandei*).
Glover's Scale (*Mytilaspis gloveri*).

Plant Diseases.

Orange Yellows and Peach Rosette.
Crown Gall.
Fusicladium of the Apple.

*Referred to in second paragraph of Section 3 of the above Act.

Chapter II.

PROTECTION OF ANIMALS AND ANIMAL INDUSTRIES (INCLUDING GAME LAWS).

[LAWS.—*Wild Birds*: Act 33, 1896; Act 13, 1904; Act 26, 1910. *Game Laws*: Law 16, 1891; Act 8, 1906; Act 33, 1909; Act 18, 1910. *Angora Goats*: Act 29, 1908. *Ostriches*: Act 29, 1907; Act 33, 1909. *Miscellaneous Animal Products*: Act 15, 1905.

IN going through the laws concerned with the protection of animals and animal industries, we are able to classify these according as they refer to the protection of game and of wild birds, export of Angora goats and of ostriches, and imports of miscellaneous animal products.

As regards the protection of birds, Act No. 33 of 1896 constitutes the chief piece of legislation, the subsequent Acts noted above merely amending and extending the provisions of the main Act. The killing or catching of certain birds is prohibited under pain of a penalty, and the Governor in Council is empowered to add to the list of protected birds from time to time. Certain scheduled animals and birds, regarded as game, are also protected similarly, a close season being provided from 16th August to 30th April. Protection of game, including "big game," is also indirectly afforded by Act No. 33 of 1909, which prohibits the export of elephant tusks weighing less than eleven pounds, and prescribes an export duty of 20 per cent. *ad valorem* on the horns, hides and skins of certain specified animals and on the tusks of elephants and hippopotami.

The mohair and ostrich industries are protected, the former by Act No. 12 of 1908, and the latter by Acts Nos. 40 of 1901 and 29 of 1907. The export of Angora goats is prohibited except to such other parts of South Africa as have similar legislation governing export; and the same restrictions exist in respect of ostriches and ostrich eggs.

It was chiefly with a view to protecting the bee industry by endeavouring to prevent the entry of the disease foul brood, that Act No. 15 of 1909, known as "The Exotic Animals and Animal Products Act, 1909," was passed. This Act provides that no animals such as are usually included among zoological specimens, bees and their larvæ, honey, beeswax (including foundation comb), or honey and other unmanufactured products of apiculture, may be imported into Natal by sea or land except with the consent of the Minister of Agriculture. A heavy penalty is prescribed for contravention.

I.—WILD BIRDS AND GAME.

ACT No. 33, 1896.

"For the Protection of certain Insectivorous and other Wild Birds."

1.—*Prohibition of Killing and Taking of Birds Specified in Schedule, or their Eggs.*—No person shall kill, catch, shoot at, or attempt to kill, catch, or aid in killing, catching, or shooting at any of the birds specified in the schedule to this Act, and no person shall at any time take, injure, or destroy the eggs of any of the said birds, except by express permission of the Governor for the purpose of scientific research. Every permission so granted shall specify the particular birds or eggs thereof to which the same shall apply, the time for which it shall endure, and in what division or divisions it shall have effect. A return of such permits shall be laid before the Legislative Council and Legislative Assembly at the next ensuing session.

2.—*Governor in Council may add to the list of Birds.*—It shall and may be lawful for the Governor in Council to add to the list of birds specified in the schedule to this Act the names of any others which it may be deemed desirable to protect, and upon promulgation to that effect in the *Natal Government Gazette*, the provisions of this Act shall be taken to apply to such additional birds in the same way as if they were enumerated in the schedule hereto: Provided always, that a list of any such additions shall be laid before the Legislative Council and Legislative Assembly during the next ensuing session.

3.—*Punishment of Offences.*—Any person contravening any of the provisions of this Act shall, upon conviction, forfeit a sum not less than Half-a-Crown, and not exceeding £1 Sterling, and in default of payment thereof, shall be imprisoned, with or without hard labour, for a period not exceeding one month: Provided always that it shall and may be lawful for any Resident Magistrate, before whom any case is brought, to discharge any juvenile offenders or those offending for the first time with a reprimand.

4.—*Prosecutions.*—All contraventions of this Act may be prosecuted by any person before the Court of the Magistrate of the Division in which the contravention of the Act took place, or in any Branch Court in such Division.

6.—*Arrest for Contravention.*—Any person contravening any of the provisions of this Act may be detained by any constable, or the owner or occupier of land upon which trespass is being made, unless he shall, when thereto required, give his full name and address. Any person giving a false name and address shall be liable to a penalty of £2 Sterling.

SCHEDULE.

<i>English Name.</i>	<i>Kafir Name.</i>
Locust-bird (large)	Uwamba
Locust-bird (small)	Ijiyankomo <i>alias</i> Ihlolam vula
Tick-bird (red-beak)	Ihlalanyati
Swallows (all varieties)	Inkojane
Wagtail	Unevemve
White Stork	Igelantete

PROCLAMATION No. 22, 1905.

(Dated 17th February, 1905.)

Act No. 33, 1896, shall be taken to apply to the birds enumerated in the Schedule attached hereto, in the same way as if they were enumerated in the Schedule to the said Act No. 33, 1896.

<i>English Name.</i>	<i>Kafir Name.</i>
Black-headed Oriole (<i>Oriolus larratus</i>)	Umqungongo
Large Drongo Shrike (<i>Buchanga assimilis</i>)	Irtengu
Small Drongo Shrike (<i>Dicrurus ludwigii</i>)	Intengwana
Durban Wood Shrike (<i>Bradyornis woodwardi</i>).	
Black Wood Shrike (<i>Bradyornis ater</i>).	
Helmet Shrike (<i>Prionops talacomo</i>)	Ipemvu
Grey Cookoo Shrike (<i>Graculus caesi</i>).	
Hartlaub's Cookoo Shrike (<i>Campophaga hartlaubi</i>).	
Black Cookoo Shrike (<i>Campophaga nigra</i>).	
Red-winged Bush Shrike (<i>Telophonus senegalus</i>)	Inqupan
Large Puff-backed Bush Shrike (<i>Dryosopus rufiventris</i>)	Iboboni
Lesser Puff-backed Bush Shrike (<i>Dryosopus cubla</i>)	Umhlopekasi
Large Grey-headed Bush Shrike (<i>Lanairius poliocephalus</i>)	Uhlazi
Orange-breasted Bush Shrike (<i>Lanairius sulphureipestus</i>).	
Reddy-breasted Bush Shrike (<i>Lanairius rubiginosus</i>).	
Olivaceous Bush Shrike (<i>Lanairius quadricolor</i>)	Ugongoni
Fiscal Shrike (<i>Lanius collaris</i>)	Iqola
Black-backed Shrike (<i>Lanius colurio</i>).	
White-flanked Flycatcher (<i>Batis molitor</i>)	Incwaba
Spotted Flycatcher (<i>Muscicapa grisola</i>).	
Blue-grey Flycatcher (<i>Muscicapa coerulescens</i>).	
South African Paradise Flycatcher (<i>Terpsiphone perspicillata</i>)	Uve
Broad-billed Flycatcher (<i>Smithornis capensis</i>).	

English Name.	Kafir Name.
Natal Thrush (<i>Geocichla guttata</i>).	
South African Thrush (<i>Geocichla litsitsirupa</i>).	
Natal Mocking Bird (<i>Cossipha bicolor</i>)	Monanda
Natal Chat Thrush (<i>Cossipha natalensis</i>).	
Cape Chat Thrush (<i>Cossipha caffra</i>).	
Bar-throated Warbler (<i>Aphlis thoraica</i>).	
Fawny-headed Warbler (<i>Dryadromas fulvicapilla</i>)	Ugigi
Short-tailed Bush Warbler (<i>Sylviella rufescens</i>).	
Brown-throated Bush Warbler (<i>Eremomela usticollis</i>).	
Green-backed Bush Warbler (<i>Camaroptera olivacea</i>)	Imbuzana
Grey-backed Bush Warbler, Tailor-bird (<i>Camaroptera sundevalli</i>)	Uboii
Smith's Fantail Warbler (<i>Cisticota aberrans</i>)	Ngceta
Common Fantail Warbler (<i>Cisticol terrestris</i>)	Udogwe
Jardine's Babbling Thrush (<i>Crateropus jardinii</i>).	
Natal Fantail Warbler (<i>Cisticola natalensis</i>).	
Homing or Carrier Pigeons.*	
Black and White Titmouse (<i>Parus niger</i>).	
Sunbirds, all varieties.	
White-eye (<i>Zosterops virens</i>)	Umhlwane
Larks, all varieties.	
Bush Weaver Bird (<i>Spcoprotus bicolor</i>)	Itilongo
Hoopies, all varieties.	
Nightjars, all varieties.	
Bee-Eaters, all varieties.	
Kingfishers, all varieties.	
African Trogon (<i>Hap-aloderma narina</i>)	Umjeninengu
Cuckoos, all varieties.	
Hammerkop, Mud-lark (<i>Scopus umbretta</i>)	Itegwana
Woodpeckers, all varieties.	

ACT No. 13, 1904.

"To amend Act No. 33, 1896, entitled Act 'for the protection of certain Insectivorous and other Wild Birds.'"

1.—Word "*wild*" expunged.—The word "*wild*" wherever occurring in Act No. 33, 1896, shall be expunged.

2.—Addition of *Homing Pigeons*.—Homing or carrier pigeons shall be added to the list of birds in the Schedule of Act No. 33, 1896.

*Added by Act No. 13, 1904" 9.v.

3.—*Magistrate's Jurisdiction.*—The Magistrate before whom any person is convicted of killing, catching, or shooting at homing or carrier pigeons may, in passing sentence, adjudge such person to pay to the owners of the pigeons the value thereof or of the injury which may have been done them, not exceeding Five Pounds (£5) Sterling, and any sum so awarded may be levied in execution of the Magistrate's judgment, together with the costs incidental to the levy.

ACT No. 26, 1910.

"To authorise the suspension of Act No. 33, 1896, in regard to the Tick Bird."

1. The Governor may from time to time by Proclamation suspend the operation of Law No. 33, 1896, in regard to the bird known as *Buphaga erythrorhynchos*, the Tick Bird (red beak) or *Ihlalanyati*. Such Proclamation may extend to the whole of the Colony or to any specified part or parts, and may be revoked by a like Proclamation.

LAW No. 16, 1891.

"To Consolidate and Amend the Laws relating to Game."

2.—*Definitions.*—In this Act—

"Game" means any of the animals or birds mentioned in Schedules B and C of this Act.

"Owner" includes a corporation, local board, trustee, and any person having charge of lands under statutory authority, or private trust or the like.

"Occupier" includes any person having shooting rights over any land under a written agreement.

"Native Trust Lands" means lands belonging to the Natal Native Trust or held in any public trust for Natives.

"The Minister" means the Minister whose department is charged with the administration of this Act.

The expression "kill or catch," or any like expression, includes intentionally disturbing, chasing, shooting, or shooting at, injuring or destroying, in whatever manner or by whatever means, and also includes any attempt to do any of such things; and also includes aiding or being knowingly a party to any of such acts.

3.—*Close Season.*—The close season under this Act begins on the sixteenth day of August, and continues to the thirtieth day of April, inclusively, in each year. The Governor in Council may, however, by proclamation, vary the close season for any species of game mentioned in the proclamation.

4.—*Prohibited Methods of Capture.*—No person shall at any time kill or catch any game by means of nets, springs, gins, traps, snares, pitfalls, or sticks, or have in his possession for the purposes of killing or catching any game, or set any such thing as aforesaid for such purposes.

The section shall not, however, apply to the destruction of the birds included under Schedule B by Natives by means of sticks within a native location at any time out of the close season.

No person shall at any time kill or shoot at with a shot gun, that is to say a gun discharging more than a single bullet at a time, any kind of antelope or deer except rheebok, boschbok, bluebok, klipspringer, duiker, grysbok, inhlengane, and imbalala.

5.—*Restrictions on Killing Game.*—No person shall during the close season kill or catch any of the game mentioned in Schedule B of this Act.

6. No person shall at any time kill or catch any of the game mentioned in Schedule C of this Act except under the authority of a permit signed by the Minister, who shall, subject to the special provisions of this Act, have full discretion to grant or refuse such permit.

Application for a permit shall be made to the Minister in writing.

Every license to kill game in a reserve, or to kill any of the game mentioned in Schedule D, shall bear stamps up to a value calculated according to the rates respectively shown in Section 8 and Schedule D so far as they may apply, and sufficient to cover all game for which the permit is granted, but in no case shall the stamps be of a less value than Five Pounds (£5). No refund will be made in the event of the holder of the permit being unsuccessful in killing or catching any of the game mentioned.

No such permit shall be granted for or be available at any time except from the first day of May to the fifteenth day of August inclusively.

No such permit shall include roan antelope, buffalo cow, or koodoo cow, more than one black rhinoceros, one hippopotamus, one buffalo bull, two waterbuck, one koodoo bull, two inyala, and two impala.

The permit may contain such special conditions as the Minister may think proper, or as may be required by the regulations.

The permit shall be personal and not transferable, and shall specify the description and number of each class of game to be killed or caught, the time during which it will be available and the place in which it is to be used. Not more than one permit shall be issued to any person during any one year.

The permit must be produced to the Magistrate of the Division in which it is to be used for endorsement by him, and it shall not be available for use until so endorsed.

Every person hunting under the authority of a permit shall be required to produce it whenever so required by a constable or other person having authority for the purpose of inspecting licenses.

7. No person shall at any time kill or catch any of the game mentioned in Schedule E, nor shall any such game be included in a permit. The Governor in Council may, by proclamation, add to the list in Schedule E any game to which it may in his opinion be necessary to give special protection, and this Act shall apply to game so added as if it were included in Schedule E of this Act.

8.—*Reserves—Permits.*—Reserves, within which it will not be allowed to kill or catch game at any time without a special permit granted by the Minister, for the varieties of game specified therein may from time to time be established by the Governor in Council by notice in the *Natal Government Gazette*. Such notice may from time to time be varied or revoked by a like notice.

All Reserves heretofore established in the Province of Zululand shall be deemed to be Reserves established under this Act.

Every such special permit will be granted upon the same terms, and under the same conditions, and subject to the limitations in regard to the game which may be included in the permit, as are hereinbefore provided with regard to permits to kill and catch the game mentioned in Schedule C.

Every such permit shall bear stamps to the value of Ten Pounds (£10) irrespective of, and in addition to, any special sum appointed by Schedule D.

Any person found in a Reserve in circumstances indicating that he was unlawfully in pursuit of any game, shall be guilty of a contravention of this Act, unless he shall satisfy the Court that he was not there for any such purpose.

9.—*Cancellation of Permits.*—Any permit under this Act shall be cancelled by the Magistrate if it is found that the person to whom it was granted has made a fraudulent or illegal use of it, or has killed or caught any game in excess of or other than that specified in the permit, or has broken any of its conditions, or if he refuses, or fails without just excuse, to produce it when so required by a person having authority for the purpose. The permit shall thereupon become void, and no refund will be made of the money paid for it.

10.—*Special Permits for Killing certain Destructive Game.*—It shall be lawful for any Magistrate, notwithstanding the foregoing provisions of this Act, on the application of the owner or occupier of any land who

shall satisfy him that hartebeest, boschbok (male and female), duiker, hares, partridges, or guinea fowl, are causing loss and damage by destroying trees, plants, or standing crops, to grant a special permit to the person applying to destroy in whatever manner he may please such hartebeest, boschbok (male and female), duiker, hares, partridges, or guinea fowl upon such land only, during a time to be specified in the permit, but not exceeding six months in duration and renewable from time to time upon further application of the owner or occupier.

11.—*Killing Destructive Game in Zululand.*—The Minister shall have power to grant permission to residents of the Province of Zululand, to kill game during the close season, if it proved to his satisfaction that the game is doing damage to crops, or in times of scarcity. Such permission may exclude any specified kinds of game, and shall in no case include elephants, white rhinoceros, eland, roan antelope, buffalo cow, koodoo cow, or springbok.

12.—*Killing Game on Crown Lands, etc.*—If any person shall kill or catch any game upon Crown Lands, or Native Trust Lands, or go upon any Crown Lands or Native Trust Lands, with intent to kill or catch any game, without having first obtained from the Magistrate of the Division a written permit for the purpose, or if he shall kill or catch any game otherwise than is authorised by such permit, he shall be guilty of a contravention of this Act.

Permits.—The permit shall specify the game to be killed or caught, the locality in which the permit is to be used, and the time for which it is to be available. The Magistrate may revoke a permit, and from that time it shall cease to be of any authority.

Nothing in this section shall be deemed to dispense with the necessity of obtaining a permit from the Minister, in the cases hereinbefore mentioned.

13.—*Trespassing in Pursuit of Game.*—If any person shall, with intent to kill or catch any game, trespass upon any land, other than Crown Land, or Native Trust Land, without the consent of the owner or occupier, he shall be guilty of a contravention of this Act.

14. Any person so going upon Crown Land or Native Trust Land, or trespassing upon private land as aforesaid, may be required, in the case of Crown Land or Native Trust Land, by the Magistrate or by a constable, or game conservator, or any other person authorised by the regulations, and in the case of private land by the owner or occupier, or his agent or servant, to forthwith quit such land, and also to state his name and residence; and if he shall refuse or wilfully delay to quit the land, or to give his true name and address when required to do so, he shall be guilty of a contravention of this Act.

15.—*Unlawful Possession of and Dealing with Game.*—Any person

who shall during the close season possess, carry, sell, or offer for sale, any game, dead or alive, mentioned in Schedules B and C of this Act, or who shall at any time possess, carry, sell, or offer for sale, any game, dead or alive, for which the Minister's permit is required, shall be guilty of a contravention of this Act, unless he shall prove that the animal or bird was either killed or caught, or bought or received during the period in which such animal or bird could be legally killed or caught, or that it has been lawfully killed or caught in pursuance of a permit, the case may be, or that it has been imported by sea.

Any person who shall be found in the possession of any of the game authorised in Schedule E, dead or alive, shall be guilty of a contravention of this Act, and shall be liable to the same punishments as are provided for killing or catching such game as aforesaid, unless he shall show that he became lawfully possessed thereof, and that there was no infringement of this Act in respect of the killing or catching of such game.

16.—*Forfeiture*.—Any game, or the carcase thereof, or any skin, hide, horn, tusk, or other part of the carcase of any game, found in the possession of any person, may be seized and forfeited to the Government without any adjudication of forfeiture being required, unless it is shown that it has been obtained without infringement of this Act.

17.—*Employment of Natives*.—No person shall employ a Native to hunt game. A person holding a permit or otherwise lawfully engaged in hunting game may, however, employ Natives to assist him, but such Natives shall not use firearms.

18.—*Regulations*.—The Governor in Council may from time to time make regulations for any of the purposes of this Act.

The contravention of any such regulations shall be punishable by a fine not exceeding Five Pounds (£5).

19.—*Punishment of Contraventions*.—Any person guilty of a contravention of this Act for which no special punishment is appointed shall be liable to a fine not exceeding Ten Pounds (£10), and in default of payment to imprisonment, with or without hard labour, for any term not exceeding three months.

In cases where the contravention is in respect of game included in Schedule D, or killing or catching game in a Reserve without the necessary permit, the person shall, in addition to any penalty which may be imposed, be adjudged to forthwith pay to the Magistrate the amount of any license or permit, which in terms of this Act should have been first obtained.

20. Any person who shall kill or catch any of the game mentioned in Schedule E, or who, without having the proper permit by the Minister, duly endorsed by a Magistrate, shall kill or catch any hippopotamus or black rhinoceros, shall be liable to a fine not exceeding One Hundred

Pounds (£100), and in default of payment to imprisonment, with or without hard labour, for any term not exceeding six months.

21.—*Imprisonment*.—In any prosecution under this Act it shall be lawful for the Court, upon a second or later conviction, or if the Court is of opinion that, having regard to the circumstances of the case, a fine would be an inadequate punishment, to impose such sentence of imprisonment as is appointed for the offence without giving the option of a fine.

23.—*Zululand*.—The Governor in Council may from time to time, by proclamation, remove any specified game from the lists contained in Schedules B or C of this Act, as regards the Province of Zululand, and may transfer such game to the list in another schedule, for the purposes of the said Province. Such proclamation may from time to time be varied or revoked by a like proclamation.

Subject to the powers of alteration given as aforesaid, the following game shall, as regards the Province of Zululand, be excluded from the Schedule C and included in Schedule B of this Act: The imbabala or female boschbok, the rooi rhebok, the male rietbok, the steenbok, the inkumbi or red boschbok, the paauw, koran, and crane.

[Dated 29th June, 1906.]

SCHEDULE A.

[List of enactments repealed.]

SCHEDULE B.*

All varieties of the birds undermentioned, and known in this Colony as the partridge, pheasant, dikkop, wild guinea fowl.

Hares and all varieties of the antelope genus, generally known in this Colony as the rhebok, boschbok, bluebok, duiker, grysbok, inhlengane; also the zebra and blue wildebeest.

SCHEDULE C. †

The hippopotamus, commonly called seacow, steenbok, klipspringer, hartebeest, eland, koodoo, rietbok, impala, inyala, blesbok, ouribi, rooi rhebok, female boschbok, commonly known as imbabala, red boschbok, commonly known as inkumbi, buffalo, waterbuck, rhinoceros, Java or Mauritius deer, paauw, korhan, crane, and ostrich.

* Referred to in Sections 5 and 15; and as amended by Act 18, 1910.

† Referred to in Sections 6 and 15; and as amended by Act 18, 1910.

SCHEDULE D.*

Stamp duties upon permits to shoot game:—

For each Hippopotamus	£20
For each Black Rhinoceros	£20
For each Buffalo Bull	£10
For each Koodoo Bull	£10
For each Eland Bull	£5

SCHEDULE E.†

Elephant; White Rhinoceros; Eland Cow; Roan Antelope; Springbok; Buffalo Cow; Koodoo Cow.

ACT No. 18, 1910.

"To amend the Game Act No. 8, 1906."

1. A Magistrate shall, upon application by any landowner in his Division, grant him a permit for the destruction of hares upon his land during the close season of any year.

2. The Klipspringer shall be transferred from Schedule B to Schedule C of the Game Act No. 8, 1906.

ACT No. 33, 1909.

"To regulate the export of elephant tusks and the horns, hides and skins of certain game."

1.—*Export of Tusks under 11 lbs. Prohibited.*—No elephant tusk weighing less than eleven pounds shall be exported from the Colony. Any person exporting or attempting to export a tusk in contravention of this Act shall be liable on conviction before a Magistrate to a fine not exceeding £50 and the tusk shall, if found, be confiscated.

2.—*Export Duty on Certain Hides, etc.*—The horns, hides or skins of the animals mentioned in the schedule to this Act, and the tusks of elephants and hippopotami shall be subject upon export from the Colony to a duty of twenty per cent. of their value at the port of export.

Any person exporting or attempting to export any hides, skins, tusks or horns as aforesaid in contravention hereof shall be liable on conviction before a Magistrate to a fine not exceeding ten pounds sterling for every such article exported or attempted to be exported, or in default of payment thereof to imprisonment with or without hard labour for a period not exceeding three months unless such fine be sooner paid.

*R.ferred to in Sections 6 and 19.

†Referred to in Sections 7 and 20.

3.—*Customs Laws Applied.*—The export duties under this Act shall be paid to the Collector of Customs and the Customs laws and regulations applicable to the collector of import duties, seizure and forfeiture of articles liable to such duty, and all other matters incidental thereto shall, *mutatis mutandis*, and as far as may be practicable, apply to such export duties and articles liable thereto, subject to any special alterations which may be made by the regulations hereinafter provided for in order to adapt such and regulations to the purposes of this Act.

4.—*Regulations.*—The Governor in Council may from time to time make regulations for giving effect to this Act.

Schedule.

Elephant, rhinoceros, hippopotamus, giraffe, or cameleopard, buffalo, eland, koodoo, hartebeest, bontebok, hlesbok, gemsbok, rietbok, klip-springer, zebra, quagga, Burchell's zebra or any gnu or wildebeest of either variety.

II.—ANGORA GOATS.

ACT No. 29, 1908.

"To amend the Law relating to the Export of Angora Goats."

Short Title: "The Angora Export Act, 1908."

1.—[Repeal of Angora Export Duty Act (No. 12), 1907.]

2.—*Export of Angora Goats Prohibited except in certain cases.*—

- (1) On and after the coming into operation of this Act, it shall not be lawful to export from this Colony, save as in this section provided, any Angora ram or ewe.
- (2) Nothing in this section contained shall apply to the export of any Angora ram or ewe from this Colony to any Colony or territory in South Africa in respect of which the Governor shall declare by proclamation in the *Government Gazette* that there is a law in force in such Colony or territory prohibiting, under penalties equal to the penalties hereinafter mentioned, the exportation therefrom of Angora rams or ewes, except to a Colony or territory in South Africa which is in like manner exempted from the prohibition contained in such law.*

See *Government Gazette* for Nov. 13 and Dec. 23, 1908, for the application of this sub-section to the other S.A. Colonies, etc.

3.—*Penalty for Contravention.*—Any person who shall contravene the provisions of this Act shall be guilty of an offence, and shall be liable on conviction to imprisonment with or without hard labour for a period not less than one year and not exceeding two years.

[Dated 17th Oct., 1908.]

ACT No. 29, 1907.

"To prohibit the Export of Ostriches and Ostrich Eggs."

Short Title: "The Ostrich Export Prohibition Act, 1907."

2.—*Export of Ostriches or Eggs Prohibited.*—It shall not be lawful to export any ostrich or ostrich egg, except as hereinafter provided, to any place beyond the limits of this Colony, or to any country separated therefrom by sea: Provided, however, that this prohibition shall not apply to the export of any ostrich or ostrich egg to any neighbouring Colony or State which shall, by its own Legislature, have similarly prohibited the exportation of ostriches and ostrich eggs, subject to the aforesaid exemption, to any neighbouring Colony or State, and under a penalty not less than that provided for by this Act: And provided also that nothing in this Act shall prevent the export of the shells of ostrich eggs the contents of which have been removed, or of ostrich eggs which have been rendered unfertile, provided that in the latter case a permit to export shall have been obtained from the officer appointed by the Government for that purpose.

3.—*Penalty.*—Every person who shall contravene the provisions of this Act by exporting any ostrich or ostrich egg (except as hereinbefore excepted), shall on conviction be liable to imprisonment with or without hard labour for any term not less than twelve months nor more than two years.

4.—*Jurisdiction of Court.*—All penalties under this Act may be enforced in the Court of the Magistrate of the Division in which the offence was committed.

ACT No. 15, 1909.

"To control the introduction into Natal and to regulate the disposal of exotic animals and animal products."

Short Title: "The Exotic Animals and Animal Products Act, 1909."

1.—*Introduction Prohibited.*—No animal or animal product mentioned in the schedule to this Act shall be introduced into the Colony by sea or land save with the consent of the Minister of Agriculture previously obtained, and under such conditions as he may prescribe.

2.—*Confiscation or Destruction, in case of Contravention.*—Any animal or thing which may be introduced into this Colony in contravention of this Act or the regulations which may be framed thereunder shall be confiscated and destroyed or disposed of as the Minister in charge of the Agricultural Department may direct.

3.—*Penalty.*—Any person who may contravene any of the provisions of this Act or of the regulations which may be framed thereunder shall, on conviction in the Court of a Magistrate, be liable to a fine not exceeding one hundred pounds sterling, or, in default of payment, to imprisonment, with or without hard labour, for a term not exceeding six months, or to both such fine and imprisonment, unless he shall prove to the satisfaction of the Court that the introduction was made by him unknowingly and without negligence on his part. Offences under this Act shall be cognisable in the Courts of the Magistrates having jurisdiction.

4.—*Saving of Existing Laws*—Nothing in this Act shall be deemed to repeal the provisions of any Law or Act relative to any disease of animals.

Schedule.

Bees and their larvæ, honey, beeswax (including foundation comb), honeycomb and other unmanufactured products of apiculture.

Such animals as are usually included among zoological specimens.

Chapter III.**BRANDING AND EAR-MARKING.**

[LAWS.—Law 22, 1882; Law 13, 1889; Act 40, 1901.]

The laws with which we are concerned in this chapter—namely, those relating to branding and ear-marking—have been framed for the protection of stock-owners, to prevent the obliteration or alteration of brands and ear-marks on live stock. There are three laws in existence on the subject, viz., Law No. 22 of 1882, Law No. 13 of 1889, and Act No. 40 of 1901. Under the second of these the marking of cattle in any way with intent to defraud, or the obliteration or alteration of marks to the same end, renders the guilty person liable to conviction on the charge of falsity. Furthermore, the removal of the ear or any part of it from an animal (which would obviously render the obliteration of ear-marks an easy matter), is also liable to a penalty, under Law 22 of 1882. Ostriches are protected chiefly by Act No. 40, 1901; but also by Law No. 13 of 1889.

LAW No. 22, 1882.

“To declare the Law relating to the Fraudulent Marking or Branding of Ostriches and Cattle, and the Fraudulent Obliteration or Alteration of Brands or Marks on Ostriches and Cattle.”

1.—*Fraudulent Branding Constitutes Falsity.*—Every person who, with intent to defraud, or to enable another to defraud, any person, shall mark or brand, or cause or procure to be marked or branded, any ostrich or cattle, with any mark, brand, or earmark, shall be guilty of the crime of falsity.

2.—*Fraudulent Obliteration or Alteration of Brand Constitutes Falsity.*—Every person who, with intent to defraud, or to enable another to defraud any person, shall obliterate or alter or cause or procure to be obliterated or altered any mark, brand, or earmark, on any ostrich or cattle shall be guilty of the crime of falsity.

5.—*Interpretation of “Cattle.”*—In this Law “cattle” shall be taken and deemed to mean any bull, bow, ox, heifer, or calf, and any goat, ram, sheep, ewe or lamb, and any horse, mare, gelding, colt, filly, mule, or ass.

LAW No. 13, 1889.

"To prevent the practice of cutting the ears of certain animals for the purpose of making or obliterating distinguishing earmarks."

1.—*Ears of Animals not to be cut.*—It shall not be lawful for any person to cut off or remove the ear of any sheep, goat, horse, donkey, mule, or other animal, for the purpose of a private mark. Any person contravening this section shall be liable to a penalty not exceeding £5.

2.—*Penalty for Obliterating or Removing Private Marks.*—Any person who shall cut off or remove the ear or any portion thereof, or shall pierce or stump the ear of any sheep, goat, horse, donkey, mule, or any animal belonging to the class of horned cattle, being the property of any other person, with the intention of obliterating any private mark, or in such a way as would obliterate the private mark thereon, shall be liable to a penalty not exceeding £50, or imprisonment, with or without hard labour, not exceeding one year, or both fine and imprisonment.

4.—*Ownership of Animals Defined for Purposes of this Law.*—When any animals, such as is in this Law referred to, shall be found to have its ears cut, slit, stumped, or otherwise marked in contravention of this Law, the owner or person in whose possession such animal may be shall be deemed the person who has so contravened the law unless he shall prove that it has been done without his consent.

ACT No. 40, 1901.

"For the Protection of Property in Ostriches and Ostrich Feathers."

1.—*Ostriches to be Subject of Property as Domestic Animals are.*—Ostriches shall be the subject of property and ownership in the same manner in all respects as domestic animals, and their ownership shall not be lost merely by reason of their having strayed or being temporarily out of possession or control of their owners.

2.—*Wild Nature of Ostriches no Defence to Criminal Charge.*—Upon any charge of theft of ostriches or of ostrich feathers, or of malicious injury to or killing of ostriches, or any other offence in respect of ostriches or ostrich feathers, no exception or defence shall be competent on the ground of any presumption that they are ownerless by reason of the wild nature of the ostriches.

3.—*Registration of Brands.*—Every owner of ostriches shall, within one month after being possessed of ostriches, register a description of the brands which he uses or intends to use for branding his ostriches. No two persons shall be allowed to register the same brand or brands so similar as to be likely to be mistaken for each other.

4.—*Ostriches to be Branded*.—Every owner of ostriches shall cause all ostriches above the age of twelve months to be branded with his registered brand on the thigh. .

5.—*Penalty for Failure to Brand*.—Any owner who shall fail to register his brand or to brand his ostriches and keep them well branded shall be liable to a fine not exceeding £10: Provided that there shall be an interval of not less than two months between any two convictions.

6.—*Evidence of Ownership Founded on Brand*.—If any ostrich is branded with the registered brand used by an owner of ostriches such brand shall be *prima facie* evidence that the ostrich belongs to the person whose brand it bears; and in a criminal case, upon proof of the theft of an ostrich so branded, the burden shall rest upon an accused person in whose possession such ostrich is found, of proving that the same was lawfully or innocently in his possession.

Chapter IV.

STOCK THEFTS AND POUNDS.

[LAWS.—*Stock Thefts* : Act 1, 1899 ; Act 1, 1904 ; Act 41, 1905. *Pounds* : Act 42, 1898 ; Act 12, 1905]

THE principal law framed for the detection of stock thefts is Act No. 1 of 1899, but two amending laws have subsequently been passed—Act No. 1 of 1904, and Act No. 41 of 1905.

Live stock cannot be moved from one place to another in Natal without a pass signed as provided by Section 6 of the principal law. Animals can, however, be removed by Europeans without a pass under certain conditions which are laid down under Section 26, 27 and 28 of Act 1, 1899, in which other special circumstances, in regard to Natives, are also provided for.

There are certain observations to be regarded in the purchase of cattle from Natives and Indians, which will be found set forth in the third part of the principal law; and Part IV. of the Act obliges all traders in cattle, whether butchers, auctioneers, merchants, or others, to keep records of their transactions.

The head of any Native kraal near which are found traces of any stolen cattle is made responsible for the theft; and the owner of such cattle has the right to search for the cattle anywhere in the kraal near which the tracks of the animals are found to be obliterated, and he can claim the assistance of the Natives for the purposes of the search. For further details see Section 40 of the principal Act; whilst the responsibility of suspected kraals is dealt with in the sixth part of the same law. Part VII. deals with the offence of harbouring cattle stealers; and Part VIII. is concerned with matters connected with evidence and trials, and the compensation of owners.

Of the Pound Laws, Act No. 42 of 1898 is the principal Act, the second of those noted at the head of this chapter being purely an amending one. This Act provides for the establishment of pounds for the reception of straying stock under certain conditions. The procedure to be followed in connection with the impounding of stock is laid down; and compensation for damage by trespassing cattle is provided for. The poundkeeper is responsible for stock whilst they are in his pound, and he is entitled to charge for so doing. Unclaimed cattle are to be advertised and sold by public auction, after having been first branded. The proceeds

of the sale are used to defray all lawful expenses in connection with the impoundment, and the balance is handed over to the Magistrate pending its claim by the owner of the stock sold. Provision is also made for cattle that are too wild to be driven to the pound. Attempted rescue of impounded cattle, and also illegal impounding of cattle, are subject to a penalty.

I.—STOCK THEFTS.

ACT No. 1, 1899.

"For the better prevention of Cattle Stealing and kindred crimes."

Short Title: "The Cattle Stealing Act, 1899."

Part I.

3.—[Repeal of Laws 10, 1876; 30, 1884; 46, 1884; and 17, 1891; and Acts 13, 1895; 21, 1896; 22, 1896; and 24, 1896.]

4.—*Governor in Council may exclude Zululand from Operation of Act.*—The Governor in Council may from time to time, by proclamation, declare that the Province of Zululand, or any named part thereof, shall be excluded from the operation of any specified provisions of this Act, and in the same manner to revoke any such proclamation, either wholly or in part.

5.—*Definition of Terms.*—Unless the context otherwise requires the following words in this Act have the meanings assigned to them in this section.

"Cattle?" shall mean and include animals belonging to any of the following classes: Sheep, goat, horse, ass, mule, pig, ostrich, and all horned cattle.

"Cattle Killing" and kindred words shall include killing of cattle, and any stabbing, wounding maiming, poisoning, or the infliction of any physical injury on cattle.

"Cattle Stealing" and kindred words shall include the stealing, theft, or robbery of cattle, or any portion thereof, whether flesh, skin, horns, head, hoofs, or carcass, or any other part, or ostrich feathers, as also receiving cattle or any portion thereof as aforesaid, or ostrich feathers, knowing the same to have been stolen.

"Court" shall mean the Court or Judge having jurisdiction in the matter referred to, whether it be the Supreme Court, or the Native High Court, or any Circuit Court or any Judge of the Supreme Court or of the Native High Court, or the Court of the Magistrate.

"*European*" shall, for the purposes of this Act, mean any person other than an Asiatic or Native.

"*Asiatic*" shall include all aboriginal natives of Asia, and their descendants.

"*Kraal*" shall include the hut, house, residence, or place of abode of whatever description of any Native.

"*Collection of Kraals*" shall mean any number of kraals built or erected in the same neighbourhood.

"*Native*" shall mean and include all members of any of the aboriginal tribes of Africa south of the Equator, including Griquas and Hottentots, and shall also include illegitimate children of mixed European and Native parentage, and their descendants.

A Native who is exempted from the operation of Native Law shall not be deemed to be a Native within the meaning of this Act.

"*Spoor*" shall, in addition to its ordinary meaning, include any mark, or impression on, or disturbance of, the surface of any ground, or any mark or impression on or disturbance of any grass, herbage, or wood, on such ground, or any matter or substance left or found upon such ground, grass, herbage, or wood, indicating that any person or persons or any cattle have been at the place, or have passed along in any particular direction.

Part II.

6.—*Pass Required for Removal of Cattle.*—No person shall remove cattle from any place to any other place without a pass for that purpose, which pass shall, save as is hereinafter excepted, be signed by the owner or tenant, being a European, of the place from which the cattle are to be removed, or by a Magistrate or Justice of the Peace (hereinafter referred to as "proper officers"), or by the owner, being a European, of the cattle to be removed.*

7.—*Synopsis of Pass.*—Every such pass shall be upon a printed form approved by the Government and supplied by the Magistrate, free of charge, and shall contain the following particulars:—

The name and address of the person by whom it is granted;

The date of issue;

The name of the owner of the cattle;

The number, description, and brands, if any, of the cattle;

*The passes required by this Section for the removal of cattle may be issued by any person appointed by Government for the purpose. (Sec. 5, Act No. 41, 1925.)

1. The place from which and the place to which the cattle are to be removed;

The name of the driver.

8.—*Period of Validity of Passes.*—No such pass shall be valid for longer than twenty-one days from the date of its issue, unless an extension of its period shall be endorsed thereon by a proper officer or police constable.

9.—*Consent, and Conditions for Grant of Pass.*—The person to whom application is made for a pass for the removal of cattle shall not grant such pass unless he is satisfied that the cattle are the property or in the lawful possession of the person desiring to remove the same, and unless and until there be delivered to him the written consent of the owner or tenant of the place to which it is intended to remove the cattle. He shall also be required to carefully preserve such consent for a period of six months. The provisions of this section regarding consent shall be understood as referring to cases where cattle are being removed from the place on which they have been living to some place where they are intended to remain, and not to cattle being brought from a place where they have been put for a special and temporary purpose, or being taken to some place for a similar purpose. Such consent shall also not be required in the case of cattle intended to be removed to a Native Location or to Crown Lands occupied by Natives, or to any lands not occupied by Europeans.

10.—[Certificate of ownership from Magistrate entitles Native owners to dispense with pass.]

11.—*Duration of Certificate.*—No such certificate shall endure for more than one year, but a fresh certificate may be obtained from time to time.

12.—*Power to Call for Pass and Impound Cattle.*—It shall be lawful for any proper officer or constable or any landowner or occupier through whose land cattle may be driven, or any keeper of a toll bar, or any person specially authorised by any Magistrate who may find any person removing cattle as aforesaid, to call upon him to produce such pass as aforesaid, and, if he shall fail to produce such pass, or if the number and the description of the cattle being removed, or the manner and direction in which they are being removed, or the name of the driver or owner shall not correspond in all material respects with the pass produced, then any such proper officer, constable, landowner, or occupier, toll-bar keeper, or any person specially authorised thereto by the Magistrate as aforesaid shall, if he be able to read such pass and know the same to be incorrect, be entitled to take possession of such cattle and cause the same to be conveyed to the nearest pound, there to remain until liberated by order of the Magistrate, or otherwise disposed of as hereinafter provided.

13.—*Notice and Advertisment of Impounding.*—Any person so causing cattle to be impounded as aforesaid shall communicate in writing to the poundmaster the circumstances under which the same were seized, and the poundmaster shall forthwith inform the Magistrate of the Division, and shall also as soon as possible notify, by advertisement to be published and made known in the manner in which the pound notices for such district are published and made known, the number and description of the cattle, and such information regarding the same as the person causing such cattle to be impounded shall have communicated to him. The Magistrate shall at once inform the Police of the impounding of such cattle.

14.—*Application to Magistrate for Release of Cattle.*—The person from whom the cattle have been so taken, or any other person claiming cattle so impounded as his property, or lawfully in his possession, may apply to the Magistrate of the Division or to a Justice of the Peace for an order for the liberation thereof, and such officer shall enquire into the case, and if satisfied that such cattle are the property of the claimant, or were lawfully in his possession, then such officer shall give an order, in writing, directing the poundmaster of the pound in which such cattle shall be impounded to deliver the same to the claimant upon payment of the pound fees and charges; and the poundmaster shall, at the time of the delivering of the cattle, grant a pass for the protection of such cattle until the arrival thereof at the place to which it is intended to remove the same.

15.—*Impounded Cattle may be Sold.*—Should the person claiming any cattle so seized or impounded as aforesaid fail to show to the satisfaction of the Magistrate or Justice of the Peace that the cattle claimed are his property, or were lawfully in his possession, or should the cattle be unclaimed for a period of one month after notice given by such poundmaster as aforesaid, then the same shall be dealt with in all respects as if such cattle were impounded under the provisions of the laws for the time being in force relative to the impounding of cattle; and the proceeds of sale of any such cattle shall be paid into the Public Treasury.

16.—*Natives Removing Cattle Without Passes, liable to Arrest.*—It shall be lawful for any Magistrate, constable, or proper officer, or any other person specially authorised thereto in writing by the Magistrate, or any toll-bar keeper, or any landowner or occupier through whose land any cattle may pass while on his lands, to stop and arrest any Native removing, driving, or leading such cattle, who is not provided with a pass in terms of the preceding provisions of this Act, and also to stop and arrest such cattle until he or they shall be satisfied, or have made enquiry as to the ownership of the cattle, and as to any circumstances which shall in his or their opinion give rise to suspicion, and thereupon, if satisfied,

to release such Native and the cattle, or otherwise, at his option, to send such cattle to the nearest pound, informing the poundmaster of such impounding, and thereupon the provisions of the Sections 14 and 15, and all other applicable sections of this Act, shall apply to such cattle in the same way as if they had been impounded under Section 12 of this Act: Provided always that any Native so stopped or arrested shall not be detained in custody by any person not otherwise authorised to stop and arrest him except for the purpose of forthwith delivering him to some proper authority upon some definite charge of an offence against the provisions of this Act, made *bona fide* and upon reasonable grounds, against such Native.

17.—*Natives may Arrest under Certain Circumstances.*—The inhabitants of a kraal shall have the right to stop any Native driving cattle past such kraal, and to demand from him information regarding the cattle, their owner, and the circumstances of their removal. If the person driving the cattle shall not satisfy them that he is lawfully driving such cattle, the inhabitants of the kraal may arrest him and detain the cattle. Such arrest and detention shall be at once reported to the Magistrate or the nearest police station to be communicated by the police to the Magistrate.

19.—*Liability for Wrongful Arrest.*—If any person found driving cattle shall, upon being lawfully required thereto, produce to the person requiring the same, a pass complying in all material respects with this Act, and, notwithstanding the same, the cattle found with such person shall be conveyed to the pound upon the allegation that the pass produced is not proper and sufficient, or if anyone shall, without reasonable and probable cause, wrongfully impound any cattle, or arrest any Native, under colour of the provisions of this Act, then the owner of the cattle, or anyone entitled to sue in place of the owner, or such Native, as the case may be, shall be entitled to recover compensation from such person for any damage which he may have sustained by reason of the impounding of such cattle (including all pound fees payable or already paid), and by reason of such arrest, if any.

20.—*Malicious Impounding of Cattle or Arrest of Natives.*—Any person who shall wilfully and maliciously and without probable cause wrongfully impound any cattle, or arrest any Native, under colour of the provisions of this Act, shall be deemed guilty of an offence, and in addition to any other punishment to which he may be subject shall also be liable to pay to the owner of such cattle, or anyone entitled to sue in place of the owner, or to the Native arrested, such damages as the Court before whom the case is brought shall award, and as shall not have been awarded under the preceding section of this Act.

21.—*Resisting Arrest or Impounding of Cattle.*—Any person who shall, by force or violence, or by threatening to use force, or violence, prevent, or attempt to prevent, any proper officer, constable, or landowner or tenant, or keeper of the toll-bar, or any person specially authorised by the Magistrate, from arresting any Native or cattle as aforesaid, or from conveying to the pound any cattle in cases in which he shall be entitled so to do under this Act, or who shall rescue, or attempt to rescue, any such Native, or such cattle, against the will of the person in charge thereof, either on their way to the pound in terms of this Act, or after the same shall have been impounded with any poundmaster, or otherwise, shall be guilty of an offence.

22.—*Offence of Granting False Passes.*—Any person who shall knowingly grant any pass required by this Act which shall contain any wilfully false statements or description in respect of any material matter, or who shall grant any such pass in contravention of the provisions of this Act, or who shall fraudulently alter any such pass, or who shall procur any such pass by wilfully false statements or representations, shall be guilty of an offence.

23.—*Saving of Powers to Arrest under other Laws.*—Notwithstanding anything contained in this Act, any Magistrate, Justice of the Peace, Police Officer, or other such authorised person, shall possess the same powers or arrest of persons, and the same powers in respect of seizure and detention of any cattle which he may have reasonable ground for supposing to have been stolen, or which he may by any other Law or Act be specially authorised to detain, as he possessed before the passing of this Act.

24.—*Cattle to be Driven along Public Road.*—Any Native when removing cattle shall, so far as circumstances permit, drive them by the nearest way to a public road, and shall keep upon the road so far as possible towards his destination.

25.—*Definition of Offence.*—Any person, save as is excepted in the next section, who shall remove cattle in contravention of the foregoing sections of this Act shall be guilty of an offence.

26.—*Saving as to Europeans and Police Force.*—This part of the Act shall not apply to cattle removed by Europeans from one place to some other place within the Colony distant less than ten miles therefrom, nor to cattle used by Europeans, under saddle or pack saddle, or for the purposes of conveyance or transport, nor to cattle in the possession of any member of the Natal Police Force in that capacity.

27.—*Exemptions from Arrest or Detention.*—Notwithstanding the provisions of this part of the Act, any person riding a horse or driving cattle shall in the following circumstances, the proof of which shall rest with him, be allowed to proceed without being molested for not carrying

a pass, unless there are reasons for believing that the horse or cattle have been stolen:—

- (a) If he is driving the horse or cattle to the pound under the provisions of this Act, or of the Laws relating to pounds.
- (b) If he is engaged in a matter of emergency that will not admit of delay.
- (c) If he is a Native Chief, or accompanying a Native Chief as part of his escort, or acting as messenger of a Chief.
- (d) If he is lawfully driving cattle to or from a Court for *bona fide* purposes of evidence, or under a letter or direction of the Court.
- (e) If the cattle are drawing any vehicle used for transport.
- (f) If the cattle are being driven to or from their place of working or pasturage, such place being distant not more than three miles from the kraal of the owner of such cattle.

28.—*Restriction of Meaning of Removal.*—No cattle shall be deemed to be removed within the meaning of this part of the Act merely by reason that they are found moving from place to place within the limits of the land occupied by the owner of such cattle, or of which he has the lawful use, for the purpose of keeping, grazing, or watering such cattle.

29.—*Certain Sections to Apply to Asiatics.*—The provisions of Sections 16, 19, 20, 21, and 24 of this Act shall apply to Asiatics in every respect in the same way as to Natives.

Part III.—Purchase of Cattle from Native or Asiatic.

30.—*Passes to be Produced.*—Whenever a Native or Asiatic, while removing, leading, or driving cattle for which a pass is required under the provisions of the preceding part of this Act, shall offer to sell or dispose of any of such cattle, the person to whom such cattle shall be offered for sale and disposal, and the person acting or intending to act on behalf of any such Native or Asiatic in selling or disposing thereof, before making such purchase or sale, as the case may be, shall be required to demand and receive from such Native or Asiatic a pass in terms of the provisions of the preceding part of this Act in respect of each and all such cattle, and to satisfy himself of the genuineness thereof, and in every case to use all reasonable precautions to satisfy himself that such Native or Asiatic is the owner of such cattle or otherwise rightly entitled to sell the same.

31.—*Retention of Pass by Receiver of Cattle.*—The person receiving such cattle as aforesaid shall retain the pass accompanying the same, and

if the pass shall refer to and include any other cattle than those which he shall so receive, he shall be required to furnish to the Native or Asiatic an exact copy of the pass, stating at the foot or on the back of the copy the number and description of cattle which he has received, and certifying the same under his own name; or if he be unable to write, then he shall be required to obtain a copy certified by some trustworthy person,

32.—*Purchasing Cattle without a Pass an Offence.*—Any person purchasing from or selling on behalf of a Native or Asiatic any cattle without first complying with the foregoing provisions of this part of the Act, or any person failing, neglecting, or refusing to furnish any Native or Asiatic with a certified copy of the pass in compliance with the provisions in the thirty-first section contained, shall be guilty of an offence.

33.—*Liability of Agent or Receiver in Fraudulent Sale.*—Whenever any cattle shall have been sold or disposed of in fraud of the rightful owner or the person rightly entitled to possess the same, any person who shall have received the same from a Native or Asiatics or acted on behalf of such Native or Asiatic in selling or disposing of the same may, on being sued in a competent Court, be adjudged to make good to the owner or person rightly entitled to possess such cattle, the value of such cattle, unless he shall satisfy the Court that he had complied with the provisions of this Act: Provided that nothing in this section shall be deemed to deprive any person, whose cattle have been so sold or disposed of, of any right or remedy which would otherwise be competent to him.

Part IV.—Butchers and Auctioneers.

34.—*Butchers to Keep Register of Cattle.*—Every butcher shall keep at his place of business a register in the form of Schedule 2 of this Act, in which shall be recorded, according to the tenor of the headlines of the several columns, the particulars of all cattle purchased by him or received or used for the purposes of his business.

35.—*Auctioneers, etc., to Keep Register.*—Every auctioneer and every merchant or trader or dealer who shall as such buy or sell the cattle in the way of trade shall keep a register in the form of Schedule 3 of this Act, in which shall be recorded, according to the tenor of the headlines of the several columns, the particulars of every such sale or purchase of cattle.

36.—*Butchers, Auctioneers, etc., dealing with Natives and Asiatics.*—In the case of cattle purchased from Natives or Asiatics for which a pass is required in terms of this Act, the pass or a duly certified copy thereof, when taken from the Native or Asiatic, shall be numbered by such butcher, auctioneer, merchant, trader, or dealer with the same number as that inserted in the last column of the said registers, and shall be kept for not less than one year after such purchase or sale.

37.—*Inspection of Registers.*—Every such register and the passes therein referred to may at all reasonable hours be inspected by any member of the Police Force or any person duly authorised thereto in writing by a Magistrate or other officer of police holding rank equal or superior to that of a sergeant.

38.—*Failure to Keep Register.*—Any such butcher, auctioneer, merchant, trader, or dealer, who fails to keep a register as aforesaid, or refuses or fails to allow the same, together with the passes, to be inspected as hereinbefore provided, or to give to a member of the Police Force or any other person duly authorised as aforesaid, any information which he may have in regard to cattle so purchased or sold, shall be deemed to have committed an offence against the provisions of this Act.

39.—*Manager of Business liable as well as Principals.*—The manager or other person in charge of the butcher's business, auctioneer's business, or merchant's, trader's or dealer's business, or the branch thereof at which the register should be kept, shall be under the same obligations and liabilities, and be subject to the same punishments, as are hereinbefore provided in regard to such butchers, auctioneers, merchants, traders, or dealers.

Part V.—Provisions as to Spoor of Cattle.

40.—*Responsibility in respect of Animals whose Spoor is Traced to a Kraal.*—Whenever the spoor of any cattle which have disappeared under circumstances indicating the probability of theft (which cattle are in this and the next part of this Act referred to as stolen cattle), or of any person driving stolen cattle, or of any animal used in driving them, is traced to any Native kraal or close neighbourhood thereof, responsibility in respect of such stolen cattle shall be determined as is herein-after provided, that is to say:

- (a) The head of any Native kraal (umnumuzana) shall be responsible for the value of any stolen cattle, the spoor of which is traced to such kraal; when corroborative evidence is forthcoming, to the satisfaction of the Court trying the case that the theft in question was committed.
- (b) The owner of any stolen cattle, the spoor of which has become lost or obliterated in the close neighbourhood of any Native hut, kraal, enclosure, or lands, has a right of search for any traces of any such cattle in any such hut, kraal, enclosure, or lands, and any person who shall unduly prevent any such search, or cause any wilful obstruction, or shall wilfully cause the loss or obliteration of any spoor, may be convicted of an offence under this Act.

- (c) When the owner of any stolen cattle is on the spoor of such cattle, it shall be lawful for such owner to demand from the Natives living in the neighbourhood all reasonable assistance in following up the spoor, and whoever neglects or refuses to give such assistance, may be convicted of an offence under this Act.
- (d) When such spoor cannot be traced to any specific Native kraal or kraals, but is lost, or becomes obliterated on any lands, then the responsibility for the value of any such stolen cattle shall devolve upon the heads (*abanumuzana*) of the kraals adjacent to, and surrounding the spot where such spoor has been lost or obliterated: and it shall be lawful for the Magistrate so to fix such responsibility by a penalty not exceeding two head of cattle, or their money value, to be levied by such Magistrate. Any sum so levied shall be paid to the public revenue.
- (e) Whenever a spoor is traced to or within the confines of any locality occupied by any Native kraal, or kraals, or to or within an area occupied by any community or section of a tribe, if the Native occupying such kraal or kraals or locality, or constituting such community or such section of tribe, without lawful excuse, neglect, or refuse to receive, to take over and follow such spoor, they may be convicted of an offence under this Act.

41.—*Preceding Section to apply to certain cases where Spoor only of Natives can be Traced.*—The preceding section shall apply to the following cases where there is corroborative evidence to the satisfaction of the Court that the offence was committed, in the same way as if the spoor therein mentioned had been that of stolen cattle traced to such kraal:—

- (a) Where it shall appear that cattle have been stolen or removed without any spoor of the cattle being left, but where the spoor of the persons stealing or removing the same shall be traced from the place from which the cattle have been stolen to the kraal intended to be made responsible.
- (b) Where cattle have been killed, and the spoor of some Native leads from the body of the animal killed, or the place of killing, to the kraal intended to be made responsible.

42.—*Fraudulent Creation of Spoor or making Malicious Search.*—Whoever fraudulently or with intent to injure another shall create any spoor, or shall maliciously and without reasonable cause make the search

referred to in Sub-section *b* of Section 40, shall, on conviction, be liable to either or both of the following punishments, namely:—

- (1) Imprisonment with or without hard labour for any period not exceeding one year;
- (2) A fine not exceeding Fifty Pounds Sterling, and in default of payment, to imprisonment, with or without hard labour, for any period not exceeding one year.

Part VI.—Responsibility of Suspected Kraals.

43.—*Notice of Suspicion of Neighbouring Kraal.*—Where the cattle of any person have been stolen or killed, and the delinquent cannot otherwise be discovered, but such person shall suspect the delinquent to be an inhabitant of one or more neighbouring kraals, he or some person on his behalf may thereupon give either to the Magistrate or to a member of the Natal Police Force (who shall transmit the same forthwith to the Magistrate) a written notice of the stealing or killing of his cattle, and of the kraal or kraals suspected, and thereupon the Magistrate, if satisfied by the affidavit referred to in the next section, or by further enquiry, that there is reasonable ground for suspecting such kraal or kraals, shall forthwith give, or cause to be given, a notice to the head or heads of such kraal or kraals that it is suspected that such stealing or killing has been done by an inhabitant of such kraals or one of such kraals, and that in the event of any more cattle belonging to such person being stolen or killed, and the offender not being discovered, such head or heads of kraals may be made liable to pay a penalty of the value of the cattle stolen or killed.

44.—*Affidavit in Support of Notice.*—The person whose cattle have been stolen or killed shall in every case, in addition to such notice, also lodge as soon as may be with the Magistrate or member of the Natal Police Force an affidavit setting forth the number, character, and description, so far as possible, of the cattle stolen or killed, the date of the stealing or killing, the effort to discover the offender, and the name of the kraal or kraals suspected; and any person making any wilfully false statement in any such affidavit or notice shall be deemed guilty of the offence of perjury.

45.—*Notice of Liability in case of Further Thefts.*—If after such notice has been given by such Magistrate to the head or heads of kraals, other cattle of the same person shall, within one year from the date of such notice, have been stolen or killed, such person shall, as soon as possible, if desirous of having the benefits of this Act, deliver to the Magistrate or a member of the Natal Police Force a like notice of such further stealing or killing and a sworn statement in the manner provided in the preceding section, and thereupon such Magistrate, if satisfied that

there is reasonable ground for suspicion, shall give or cause to be given notice to such head or heads of kraals that further cattle of the said person have been stolen or killed, and that failing the discovery of the offender within a reasonable period to be fixed by the Magistrate, not being less than one month, such kraal head or heads may be subjected to a penalty of the value of the cattle stolen or killed.

46.—[Police to forward copy of notice to Magistrate.]

47.—*Suspected Kraals situated in different Divisions.*—Where the suspected kraals lie within more Magisterial Divisions than one, any Magistrate within whose jurisdiction any kraals may be shall have power to deal with the matter in the same way as if all of the suspected kraals were within his jurisdiction.

48.—*Enquiry by Magistrate.*—If within the period appointed by the further notice the offender has not been discovered or compensation has not been made, the Magistrate may, without any formality of procedure, but in the presence of the kraal heads, enquire into the case.

49.—*Imposition of Penalty by Governor in Council.*—Upon receiving a report from the Magistrate that he is satisfied that any of the inmates of the suspected kraals committed the theft or killing, or had a share in it, or knew of it and took no steps to bring the offenders to justice, it shall be lawful for the Governor in Council to impose upon the heads of each of the kraals so implicated a penalty, apportioned among them as may be considered proper up to the value of the cattle, and the cost of the search and inquiry. Any such penalty shall be paid to the general revenue.

50.—*Apportionment of Penalties.*—Such penalty may be awarded against any one or more of such kraal heads, and where the penalty is awarded against the heads of more than one kraal, such kraal heads shall be severally as well as jointly liable, unless the Governor in Council shall otherwise apportion their mutual liability.

51.—*Repetitions of Offence.*—Where the stealing or killing of further cattle shall have taken place more than one year, but less than three years, from the date on which the first notice shall have been given, then a further notice may be given as provided in Section 45, and the provisions of Sections 47, 48, and 49 shall apply, except that a penalty shall only be awarded against the head or heads of the suspected kraals in case the Magistrate shall report that he be fully satisfied that the inhabitants generally of the kraals were directly implicated in the stealing or killing of such cattle.

52.—*Duty of Owner to Keep Lists of Cattle.*—This part of the Act so far as concerns stolen cattle shall not be applied in favour of any person who shall not have kept sufficient lists of the class or classes of cattle from which thefts have occurred during the period relating to the ques-

tion at issue, and no such lists shall be deemed sufficient for the purposes of this part of the Act unless they contain a true record of the actual counting of such cattle made at intervals throughout such period of not less than one month.

Part VII.—Harbouring Cattle Stealers and Cattle Killers.

53.—*Offence of Harbouring Suspected Persons.*—If any inhabitant of any Native kraal or collection of kraals shall knowingly, or having reasonable ground of suspicion, harbour or receive any person who shall have either stolen or killed cattle, or shall prevent the apprehension of such person, or shall assist him to escape, such inhabitant shall be deemed to have committed an offence against this Act; and where it shall be proved that some inhabitant had so harboured or received, or prevented the apprehension, or assisted the escape of any such person, but it shall not appear which particular inhabitant was guilty of such offence, then the head of the kraal shall be deemed guilty of an offence against this Act.

Part VIII.—Provisions as to Evidence, Trial, and Compensation in Cattle-Stealing and Cattle-Killing Cases.

54.—*Conviction of a Theft sometimes based upon Finding of Carcase, Skin, etc.*—Whenever there is reasonable evidence that cattle have been stolen and, upon any search, any portion (whether carcass, head, skin, fleece, flesh, horns, hoof, or any other part) of such cattle or any other cattle shall be found in the possession or on the premises or in the house or place or kraal, or in the immediate vicinity of the house, place, or kraal, of any person, and it shall not be made to appear to the Court that such person came lawfully by the same, or that the same was on his premises or in his house, place, or kraal, or in the immediate vicinity thereof, without his knowledge or assent, then such person may, upon any indictment or charge of having stolen the cattle first referred to or other cattle belonging to some person, whether known or unknown, be adjudged to be guilty according to such indictment or charge.

55.—*Persons found in Possession of Portions of Stolen Cattle.*—If any person shall be found in the possession of any cattle, or any portion thereof (whether carcass, head, skin, fleece, flesh, horns, hoof, or any other part) shown to be or to belong to an animal that is missing, or bearing a brand or mark shown to be that of someone else than the person in whose possession the same was found, such person may, unless it shall be made to appear to the Court that he came by the same lawfully, or that it was in his possession without his knowledge or assent, be adjudged guilty of having stolen the said cattle.

56.—*Property of Native Charged with Stealing or Killing Cattle to be Attached.*—On the apprehension or committal of any Native charged with cattle-stealing or cattle-killing the Magistrate having jurisdiction shall cause the property of such Native (except property required to support those dependent on him) to be attached until such time as such Native can be tried, and if such Native shall be acquitted, or if upon conviction the Court shall make no order imposing or granting compensation, then such attachment shall, upon the acquittal or conviction of such Native, be at an end.

57.—*Punishments for Cattle-Stealing and Cattle-Killing.*—Every Native who shall be convicted of cattle-stealing or cattle-killing shall be liable:—

- (a) On the first conviction to a whipping of not more than twenty-five lashes, or to imprisonment, with hard labour, for any term not exceeding five years, or to both such whipping and imprisonment.
- (b) On the second conviction to imprisonment with hard labour for any term not less than three years and not exceeding nine years.
- (c) On a third or further conviction to imprisonment with hard labour for any term not less than six years and not exceeding fifteen years: and
- (d) On each second or subsequent conviction to a whipping of not more than thirty lashes, in addition to any sentence of imprisonment:

Provided always:

- 1. That the punishment of whipping shall be in no case adjudged to be inflicted upon women.
- 2. That if at any time arrangements shall have been made by the Natal Government for the carrying out in any other Colony or country of sentences of transportation, then upon a second or subsequent conviction the convicted person may, in lieu of any sentence of whipping or imprisonment, be sentenced to be transported to such Colony or country for any term not less than three years and not exceeding twelve years.
- 3. That in the case of offenders who appear to be under the age of sixteen years, any whipping shall be inflicted with a rod, and not with a lash.*

*Section as amended by Act No. 1, 1904.

58.—*Compensation to Owner of Cattle Stolen or Killed.*—The Court may adjudge any person who may be convicted of cattle-stealing or cattle-killing to pay compensation to the person whose cattle have been stolen or killed for any damage which he may have sustained by reason of such stealing or killing, including any expenses incurred in the search for such cattle, and any such judgment may be recorded and carried into effect in the same manner and with the same privileges as if it were a judgment by such Court in a civil action.

59.—*Person Adjudged to Pay Compensation may Appeal.*—Any person who may be adjudged to pay compensation under the provisions of the foregoing section shall have the right to appeal to the Supreme Court or to the Native High Court, as the case may be, against the order adjudging such compensation. This section shall not be deemed to refer in any way to the verdict, judgment, or sentence in respect of the criminal charge.

60.—*Security in Case of Appeal.*—The compensation so awarded shall not be paid over to the judgment creditor until the lapse of one month from the date of judgment, unless he shall give security to the satisfaction of the Registrar or the Clerk of the Court pronouncing the judgment for the repayment of such compensation if it shall have been diminished or annulled upon appeal:

Provided always:

- (a) That if the judgment debtor give security to the satisfaction of the Registrar or Clerk aforesaid for the speedy prosecution of appeal against the said judgment, and for the due satisfaction thereof, so far as not reversed upon appeal, execution under any such judgment shall be stayed until the appeal shall have been disposed of or abandoned, unless the Court shall otherwise specially order;
- (b) That upon proceedings of appeal being instituted by any judgment debtor against any such judgment the same shall be stayed unless the Court appealed from shall otherwise specially order, or unless the judgment creditor shall give security as aforesaid for the repayment of anything received under such judgment so far as the same may be reversed upon appeal.

61.—*Evidence in Appeal.*—The Court before which any of the cases referred to in the two preceding sections are tried may at its discretion after verdict or judgment refer to the depositions in the case, and may also then and there, or at some other appointed time, take further evidence upon the question of the compensation to be awarded.

62.—*Apportionment of Liability for Compensation.*—Whenever judgment for any compensation is given in terms of this Act against more than one person, such persons shall be jointly and severally liable thereunder unless the Court shall otherwise specially order.

63.—*Liability of Parents or Guardians.*—It shall be lawful for the Court to impose upon the father or guardian of any Native or Asiatic who may be convicted of cattle-stealing or cattle-killing, and who, in the opinion of the Court, may be under the age of fourteen years, a fine not exceeding the value of the cattle so stolen or killed, as well as to adjudge such father or guardian to make compensation to the injured party in the same way as if such father or guardian had himself been convicted of stealing or killing the said cattle: Provided that such father or guardian shall not be liable to such fine or to make such compensation unless it appear that the offender was at the time of the commission of the offence under his authority and control.

64.—*Certain Acts to be Presumptive Evidence of Intent to Steal.*—Any person who shall be found within a farm or part of a farm enclosed on all sides with a fence, or within any cattle kraal, upon or near which cattle-stealing is prevalent, and who, when so found, was not proceeding along some road or thoroughfare traversing such farm or part of a farm, and who also was on such farm or part of a farm, or in such kraal without the authority or consent of the owner or occupier or of someone who was entitled, or was by the person so found *bona fide* believed to be entitled to give such authority or consent, may be found guilty by the Court before which he is tried of an offence unless he shall satisfy the Court that he was not there with any criminal intent.

65.—*Penalty on receipt of Stolen Cattle without reasonable belief in title of person delivering them.*—Any person who shall in any way acquire or receive into his possession any stolen cattle, without guilty knowledge of any theft, but without having reasonable cause (proof of which shall be upon him) for believing that the person from whom he acquired or received such cattle was lawfully entitled to dispose of the same, shall be deemed guilty of an offence: Provided always that this section shall not apply to cattle purchased on a public market, or at any auction sale or sale held under order of Court.

67.—[Repealed by Act No. 41, 1905.]

68.—[Repealed by Act No. 41, 1905.]

70.—*Saving of Rights to Prosecute other Offences.*—No prosecution or conviction for contravention of this Act shall prevent a prosecution for any offence which, but for this Act, any person might be deemed to have committed: Provided that no person be twice punished for the same act; and provided also that a prosecution or conviction for the

Illegal removal of cattle or for purchasing cattle contrary to the provisions of this Act shall not prevent a prosecution of the same person for cattle-stealing if the cattle prove to have been stolen, or for the crime of receiving such stolen cattle knowing the same to have been stolen.

Part IX.—Miscellaneous.

71.—*Rights of Action not Prejudiced.*—Nothing in this Act shall be deemed to take away any right of action or remedy which would have been competent if this Act had not been passed.

72.—*Arrest without a Warrant.*—If there be reasonable cause for believing that any person has stolen any cattle, or is or has been in unlawful possession thereof, it shall be lawful for any police constable to apprehend or cause to be apprehended such person without a warrant, and to convey him or cause him to be conveyed before a Magistrate.

73.—*Powers of Search.*—Any Magistrate, Justice of the Peace, or Commissioned, or Non-Commissioned Officer of Police, upon being satisfied that there is reason to suspect that any stolen cattle or carcasses, or any portion of the carcasses of stolen cattle, are concealed in any building, hut, kraal or enclosure, may search, or grant written authority to any person applying therefor to search such building, hut, kraal, or enclosure at any time during the day or night.

74.—*Powers of European Owners to Search.*—Any European owner or tenant of land shall, in respect of buildings, huts, kraals, or enclosures, upon his own land, be entitled to exercise all powers conferred by the foregoing section upon the officers therein mentioned.

75.—*Magistrate may Grant Compensation in Excess of his Ordinary Jurisdiction.*—A Magistrate who is under this Act authorised to try any crime or offence may, in all cases in which the Court is entitled to award any compensation to the injured party, give judgment for such compensation notwithstanding that the claim or the amount awarded may exceed his ordinary jurisdiction.

76.—*Reference to Fraudulent Pass Act, 1895.*—The reference in Section 2, Sub-section (b) of Act 16, 1895, to a pass under Laws Nos. 46, 1884, and 17, 1891, shall be deemed to be a reference to a pass under this Act.

77.—*Attempts.*—Any reference in this Act to the crimes of cattle-killing or stealing shall be deemed to include attempts to commit the said crimes.

78.—*“Sisa” Cattle.*—It shall be the duty of every Native receiving cattle for *sisa* purposes to report such cattle to the Magistrate of the Division in which he resides, and also to the Chief of his tribe. Such report shall state the name and residence of the owner of the cattle and

their number and description. The Magistrate shall keep a register of all cattle placed out for *sisa* purposes. Any failure to report the *sisa* of cattle within fourteen days shall be deemed a contravention of this Act, and if any reason appears for suspecting that the cattle have been stolen, the Magistrate may order the head of the kraal not to remove them or allow them to be removed until the permission of such Magistrate be given.

Schedule No. 1.

[(List of Laws and Acts Repealed by Section 3—already given in the reference to that section.)]

Schedule No. 2.

BUTCHER'S REGISTER OF PURCHASES.

Register No.	Date of Purchase.	From Whom Purchased.	Residence of Owner.	Number and Description of Cattle, Cows, Oxen, Bulls, Calves, Horses, Sheep, Goats, Other Animals.	Brands.	Ear Marks, or other Special Marks	Date of Slaughter	How Skins disposed of.	Number placed on Pass taken from Indian or Native.

Schedule No. 3.

REGISTER OF SALES BY AUCTIONEERS, MERCHANTS, TRADERS, OR DEALERS (OR PURCHASES, AS THE CASE MAY BE).

Registered No.	Date of Purchase, or Sale, as the case may be.	By whose instructions sold, or, as the case may be, from whom purchased.	Residence of Owner.	Number of Cattle, Cows, Oxen, Bulls, Calves, Horses, Sheep, Goats, Other Animals.	Brands.	Date of Sale or Purchase, as the case may be.	Number placed on Pass taken from Native or Indian.

ACT No. 41, 1905.

"To Amend the Cattle-Stealing Act, 1898."

1.—*Repeals*.—Sections 67 and 68 of the Cattle-Stealing Act, 1898, and Section 3 of the Proclamation No. 9, dated the 27th day of January, 1903, shall be and the same are hereby repealed.

2.—*Summary Jurisdiction*.—Notwithstanding anything contained in the Cattle-Stealing Act, 1898, Magistrates shall have summary jurisdiction in all cases of cattle-stealing and cattle-killing as defined by the said Act, and a remittal for trial shall not be necessary for the purpose of creating such jurisdiction.

3.—*Maximum Punishment*.—A Magistrate may in any such case impose a sentence not exceeding two years' imprisonment, with or without hard labour, and with or without lashes, in no case exceeding twenty.

4.—Act No. 1, 1904, shall not apply to cases tried in a Magistrate's Court.

5.—*Passes*.—The passes required by Section 6 of the Cattle-Stealing Act, 1898, for the removal of cattle may be issued by any person appointed by the Government for that purpose.

II.—POUND LAWS.

ACT No. 42, 1898.

"To amend the Law relating to the Impounding of Cattle."

Short Title: "The Pound Act, 1898."

1.—[Repeal of Laws Nos. 8, 1865; 25, 1874; and 16, 1880; and Act 11, 1897.]

3.—*Interpretation of Terms*.—In the construction and for the purposes of this Act, if not inconsistent with the context or subject matter, the following terms shall have the respective meanings hereby assigned to them, that is to say:—

"Cattle" shall mean and include all animals of the following tribes:—Horse, mule, ox, ass, sheep, or goat.

"Herd of Cattle" shall be deemed to include animals of the horse, mule, ass, and ox tribes. "Sheep" shall also include goats, and the said terms shall be deemed and taken to mean, include, any apply to any one animal of the said several kinds.

"*Stallion*" shall mean and include any entire horse above the age of two years.

"*Bull*" means any bull above the age of one year.

"*Ram*" means any ram above the age of eight months.

"*Poundkeeper*" shall mean any person who may have the authorised charge of any pound.

"*Occupier*" shall mean such person as by virtue of any agreement, lease, or otherwise, is authorised to dwell upon or occupy any lands, either in person, or by any member of his family, or by his servants and stock.

4.—*Not to apply to Municipal Borough, etc.*—This Act shall not apply to any Municipal Borough or any Township constituted under Law No. 11, 1881, nor to unfenced lands of Her Majesty's War Department, nor to any Native Location, save so far as may be enacted in pursuance of the provisions of Act No. 37, 1896.

6.—*Governor to Establish or Abolish Pounds.*—It shall be lawful for the Governor to appoint convenient places in any part of the Colony for establishing, erecting, and maintaining public pounds, and from time to time whenever it seem expedient, to abolish any pounds already established, or which may be established under this Act, and establish other pounds.

7.—*Governor to Appoint or Remove Poundkeepers.*—The Governor may appoint any person to be the keeper of a public pound, and may remove any poundkeeper at pleasure.

8.—*Establishment of Pounds and Appointment of Poundkeepers to be Notified.*—A notification of the appointment or removal of any poundkeeper, or of the establishment or abolition of any public pound, shall be inserted in the *Natal Government Gazette* and in the *Natal Agricultural Journal*, and such notification shall be deemed and taken for all intents and purposes to be evidence that such poundkeeper or pound has been legally appointed, removed, established, or abolished, as in the said notification is mentioned.

9.—*Cattle Trespassing may be Impounded.*—All cattle trespassing upon any private lands, not being lands such as are mentioned in Section 4, may be legally impounded by the owner or occupier of such land, or by anyone in the employ of or instructed thereto by the said owner or occupier.

Cattle shall not be liable to be impounded when staying upon unleased Crown lands or unfenced lands of the War Department, not used for grazing or agriculture: Provided that lands of the Crown which are built upon or otherwise continuously occupied and used for public purposes, shall, for the purposes of this Act be deemed to be private lands, and cattle trespassing thereon may be impounded.

10.—*Cattle not to be Impounded when Lawfully using Land in terms of Law 9, 1870.*—No cattle shall be liable to be impounded whilst lawfully using, in terms of Law No. 9, 1870, any land subject to the right of outspan: Provided always, that any cattle which may have trespassed upon any garden or cultivated ground, or have done any damage to any enclosure, dam, water course, hay, or corn stack, may be lawfully impounded, notwithstanding their being the property of a traveller or person who has out-spanned upon the land: And provided further, that notwithstanding the provisions of Section 15 of Law No. 9, 1870, cattle found straying untended on any public road or by-road may lawfully be impounded by the owner or occupier of the land through or alongside which such road or by road passes.

11.—*Cattle Trespassing on Unfenced Lands in Unproclaimed Township not to be Impounded.*—In any township not being a borough, and not being a township proclaimed under Law No. 11, 1881, it shall not be lawful for the owner or occupier of any erf or allotment to impound any cattle trespassing on such erf or allotment, or to recover damages in respect of or arising out of any such trespass, unless the said erf or allotment shall be proved to have been, at the time of such trespass, enclosed by a substantial fence as defined in the Fencing Law of 1887.

12.—*Description to be given of Impounded Cattle.*—Every person impounding cattle shall be bound to send such cattle to the nearest accessible pound and give an adequate description of the same: Provided always, that before a person shall be entitled to impound his adjoining neighbour's cattle he shall be bound, before so sending to the pound, to inform the owner of such cattle, by written or verbal notice, to the intent that the owner may then and there release, upon the payment of all damages, the cattle so seized for the purpose of being sent to the pound, such damages to be calculated according to the scale in Section 13: Provided that such notice shall not be required to be sent unless such cattle shall have been properly branded.

13.—*Owner or Occupier entitled to Charge Damages.*—The owner or occupier of land on which cattle have trespassed shall, without being required to prove special damage, be entitled to charge as damages according to the following scale:—

For trespass on grass land:

For each head of cattle except horses, sheep, and goats, 3d.

For each horse, 6d.

For each sheep, or goat, 1d.

For trespass on gardens, crops, or other cultivated lands, four times the above rates:

Provided that should he claim a greater amount of damages, such damages shall be determined by appraisalment as hereinafter stated in Section 30.

14.—*Persons Impounding Cattle to send a Note to Poundkeeper describing Cattle unless he Impounds them in Person.*—Any person sending cattle to the pound shall, unless he appears in person before the poundkeepers, write a note to the poundkeeper, acquainting him with their description and number and the distance in miles, and if damages are claimed shall state also in his note the kind of trespass, and where committed, as also the amount of such damages: Provided always, that when any animal shall be taken to the pound by the owner or occupier of the property trespassed upon, in person, then his verbal statement shall be taken, and be recorded by the poundkeeper, and shall be of the same effect as any such note in writing as aforesaid.

15.—*Mileage.*—On delivery of cattle at the pound, the poundkeeper (if required) shall at once pay the person delivering such cattle mileage at the rate of sixpence per mile for the first ten miles, and threepence per mile for each mile between ten and twenty miles, but never to more than one person, except it shall be shown to the satisfaction of the poundkeeper that more than one person was necessarily employed; but no mileage shall be allowed for any distance exceeding twenty miles, and no payment shall be made for returning home of any person driving or taking such cattle to the pound.

16.—*Strange Cattle not to Remain on Land without Owner's Consent.*—Save as it is in this Act otherwise specially provided, the owner or occupier of any land shall not allow any strange cattle to remain on his land for upwards of forty-eight hours, except with the consent of the owner of such cattle, after ascertaining that such cattle are running upon the land; and in default he shall be liable to a penalty not exceeding Twenty Shillings Sterling for each head of such cattle, except sheep or goats, and for sheep or goats, so allowed to remain, two shillings for each such sheep or goat: Provided that such penalty shall in no case exceed Five Pounds Sterling.

17.—*Detention of Cattle.*—A person who has seized cattle for the purpose of sending them to the pound shall be prohibited from tying them up, or confining them in a kraal or other enclosure, without food and water, for a longer period than six hours during the day time; and shall be required to send them to the pound within twenty-four hours after their seizure.

18.—*Cattle not to be Ridden, Worked, or Furiously Driven.*—No person taking or sending any cattle to the pound shall be allowed to ride or otherwise work such cattle, or by furious driving or otherwise to injure such cattle.

19.—*Poundkeeper to Erect and Maintain Pound.*—The poundkeeper shall, at his own expense, erect and keep in repair a pound or kraal sufficiently large and strong securely and safely to keep any cattle which may be sent to such pound.

20.—*If required to Erect New Pound in terms of the Lung-sickness Prevention Act to be Compensated.*—In the event of the poundkeeper being required to erect a new pound in terms of Section 31 of the Lung-sickness Prevention Act 1897, he shall receive compensation therefor to an amount not exceeding £5.

21.—*Poundkeeper to turn Cattle out to Graze Daily.*—The poundkeeper shall take care of all cattle impounded and turn them out to graze daily on suitable grazing land for at least nine hours between sunrise and sunset and under the care of a herd.

22.—*Poundkeeper Responsible for Cattle Lost while Impounded.*—The poundkeeper shall be responsible for any cattle which may be lost during the time they may be impounded, unless he shall prove that such loss was not caused by his neglect or carelessness or the neglect or carelessness of his herdsman or other person employed by him.

23.—*Substitute for Poundkeeper.*—The poundkeeper shall take care that in his absence some other person shall be on the spot to act for him, for whose conduct in the observance of the duties of poundkeeper he shall be responsible and liable as if he had been present in person.

24.—*Receipt to be given for Cattle Impounded.*—The poundkeeper shall at all times receive into the pound (except as hereinafter provided) all cattle delivered at the pound as provided in the foregoing sections, and give a receipt for the same, signed by himself or someone acting on his behalf, in form according to Schedule A of this Act: and on the release of any cattle shall give a receipt in form according to Schedule B of this Act.

25.—*Fees.*—For the cattle so impounded the poundkeeper shall be entitled to charge the following fees:—

	s.	d.
For every horse	1	0
For all cattle, except horses, sheep, and goats, per head	0	6
For every sheep or goat	0	2

For herding the poundkeeper shall charge a fee of twopence per day for every head of cattle, except pigs, sheep or goats, and pigs he shall charge sixpence per head per day,* and for sheep or goats he shall

*Added by Sec. 1 of Act 12, 1905, which reads:—"The fee to be charged by a Poundkeeper for herding pigs shall be sixpence (6d.) per head per day, and Sections 25 and 29 of the Pound Act, 1898, are hereby amended accordingly."

charge one half-penny per head per day for the period during which the said cattle, sheep or goats shall have been impounded, which shall be paid by the person claiming such cattle, sheep or goats: Provided, it shall be compulsory on poundkeepers to herd all stallions, bulls, and rams, apart from any mares, cows, or ewes which may be in the pound, and the poundkeeper shall be entitled to charge herding fees as follows:—For stallions, One Shilling per head per day; for bulls, One Shilling per head per day; for rams (either sheep or goats) Threepence per head per day.

26.—*Cattle to be Delivered up on Payment of Fees.*—When any person shall claim impounded cattle such cattle shall immediately be delivered up to him on his paying the impounding fee, the herding fee, the mileage which may have actually been disbursed by the poundkeeper, and the damages payable under the provisions of this Act: Provided, however, that the poundkeeper may require the person so claiming the cattle to satisfy him that such person is entitled to the possession of the cattle.

27.—*Diseased Animals.*—Should any animal sent to the pound be affected with any contagious or infectious disease the poundkeeper may refuse to receive such animal into the pound: but if any animals so sent be affected with contagious or infectious disease the poundkeeper shall deal with them as the law directs: and in case any animal received into the pound shall prove to be dangerously vicious, the poundkeeper shall apply to the Magistrate, who shall make such order thereupon as he shall see fit.

28.—*Poundkeeper not to use Impounded Cattle.*—The poundkeeper shall not, under pain of contravening this Act, use or cause to be used any animal sent to the pound. He shall, moreover, be liable to the owner for any damage done by him, or any of his servants, to any cattle impounded.

29.—*Poundkeeper may Detain Cattle as Security.*—Whenever the owner of any impounded cattle, or anyone in his behalf, shall apply to the poundkeeper to release the same, but be unable at once to pay the pound fees and other charges lawfully made, the poundkeeper shall deliver up the said cattle, only retaining a sufficient number from which to recover all such charges up to the time of the release or sale of the number so retained, as the case may be.

30.—*Damages, how to be Estimated.*—In every case in which damage shall be done by any cattle to any garden or crop growing on cultivated land, or trees, or to any enclosure, dam, watercourse, hay, or corn stack, it shall be lawful for the person damaged, or other person acting on his behalf, forthwith to estimate, with the assistance of two disinterested persons being land owners or registered voters, the extent of

such damage; and such estimate shall be set forth in the note required by Section 14 of this Act to be transmitted to the poundkeeper along with the cattle; or if the cattle shall have been sent to the pound before such estimate could reasonably be made, then such estimate shall be notified so soon as possible thereafter, and a fee not exceeding Three Shillings Sterling, independent of horse hire, if incurred, may be paid or contracted to be paid to each person employed to estimate such damages; and such persons shall sign an acknowledgment thereof, endorsed upon such note.

31.—*Cattle may be Detained as Security for Damage.*—Where such damage shall have been so set forth in such note, the poundkeeper shall be entitled and bound to hold a sufficient number of such cattle, to be pointed out by the owner, if he should desire it, to cover the amount of such damage; and he shall not release them on the mere payment of the poundage charges, unless in addition thereto a sum of money sufficient to cover such damage shall be deposited in his hands, or sufficient security, by a written guarantee, given to the satisfaction of the poundkeeper or the person impounding, for the payment of such damage, and the cost of assessing the same, or the person sending the cattle to the pound shall consent to their release, or such release shall be ordered by the Magistrate or other competent authority.

32.—*How Owner to proceed when Dissatisfied with Estimate of Damages.*—When the owner or person in charge of such cattle shall be dissatisfied with the estimate so put upon such damage, or with a charge made for trespass on cultivated land, when such charge is more than the amount which would be payable under this Act for trespass on grazing land, he shall be entitled, after due notice served upon the person impounding such cattle to appeal, by verbal application, to the Magistrate of the Division within which such damage shall have been committed, or to the Magistrate of the Division within which the pound to which such cattle shall have been sent shall be situated; and such Magistrate, on hearing such evidence as may be tendered, shall decide on such application summarily, and may order such cattle to be released, although the pound in which they may be impounded should not be situate within his Division. Any such Magistrate shall also make such order as to the costs of such application as he shall deem just: Provided always, that even after the amount of damages shall have been paid, it shall be lawful for the owner of such cattle or the person in charge of the same to appeal to the Magistrate of the Division in which the pound may be situate, or in which the trespass may have been committed; and in every such case the Magistrate may make such order for the repayment of any amount of the damages so paid, together with impounding fee, mileage and herding for such cattle, and to make such order as to costs as he may

see fit: Provided further, that such appeal be noted and notice thereof given to the respondent within ten days after such cattle have been released from the pound, or within ten days from the date of the appraisal of the damage caused, when no impounding of the cattle shall have taken place, and the decision of the Magistrate in any case under this section shall be final, and not subject to review or appeal when the amount of such judgment or decision, exclusive of costs, shall not exceed the sum of Fifteen Pounds Sterling.

33.—*Mileage to be apportioned where cattle claimed by different persons.*—In every case where cattle impounded under this Act are claimed or released by different persons, the poundkeeper shall divide and apportion the amount of mileage fees and damage incurred to be paid by the several claimants, according to the number of cattle respectively released by them.

34.—[Unclaimed cattle to be advertised and sold. Damages to be paid out of proceeds of sale. Poundkeeper to require authority before paying.]

35.—*Poundkeeper's Cattle found Trespassing may be sent to the next Pound.*—When cattle found trespassing or committing damage shall be the property of the poundkeeper, or person acting for the poundkeeper of the nearest pound, it shall be optional to the person or whose ground they shall be so found trespassing or committing damage, to send them to the pound whence they have strayed, or to the next nearest pound, and if he should elect to send them to such next nearest pound, he shall be entitled to receive from such poundkeeper, or person acting for him, a sum equal to one-half of the poundage charges payable for such cattle, in addition to the mileage dues, irrespective of damages to which he may be entitled.

36.—*Cattle on their way to the Pound to be released on tender of Damages and Mileage.*—Whenever any person claiming cattle seized for the purpose of impounding them shall tender payment of the damage legally charged or assessed, with fees due to the assessor, and mileage, if incurred, before such cattle shall be impounded, the cattle shall be immediately released and given up, but such tender shall not debar such owner from

37.—[Poundkeeper to keep books.]

38.—[List of impounded cattle to be sent to Colonial Secretary and advertised.]

39.—*Branding and Sale of Advertised Cattle.*—All cattle thus advertised, unless previously released, shall on the day appointed for the sale be effectively branded on the right shoulder with the letter P. (for which the poundkeeper shall be entitled to charge One Shilling for every

animal branded other than sheep or goats, and for each sheep or goat One Penny), and shall be sold by the poundkeeper, or by someone acting on his behalf, for cash; and all such sales shall take place by auction at the public pound where the said cattle shall have been impounded, and shall commence at the hour of noon, and the poundkeeper shall neither personally, nor by any other person, either directly or indirectly, purchase any of the said cattle, and every person offending herein shall on conviction forfeit and pay for every such purchase contrary to the true intent and meaning hereof any sum not exceeding Fifty Pounds Sterling.

40.—[Poundkeeper not to require an auctioneer's license, nor to account for any fee or duty to Government.—Animals to be sold singly except mares with foals, and cows with calves.]

41.—*Proceeds of Sale, how to be applied.*—The poundkeeper shall receive the price of any impounded cattle sold under this Act, and, subject to any rules in that behalf, he shall apply the same first in the payment of all lawful fees and other authorised charges, next in payment of the sum due to the person at whose instance the same were impounded, and the residue he shall pay over forthwith to the Magistrate. Such moneys shall then be held for the person entitled thereto, who, upon giving such proof as the Governor shall require, may demand and receive such moneys, and if no claim thereto be established within two years the moneys shall become forfeited to the Government.

42.—*Cattle too Wild to be Driven to the Pound.*—The occupier of any land whereon are found running strange cattle too wild to be driven to the pound shall be bound, within forty-eight hours after ascertaining that such cattle are running upon the said land, to send to the nearest accessible poundkeeper a verbal or written description of the said cattle, together with a verbal or written statement to the effect that the cattle so running are too wild to be driven to the pound; and in default he shall be guilty of a contravention of this Act. This section and the following sections which refer to cattle too wild to be driven to the pound shall not apply to sheep or goats.

43.—*Inspection of such Cattle by Poundkeeper.*—The poundkeeper shall satisfy himself, by personal inspection, that such cattle are according to the description given, and are too wild to be driven to the pound; the expense of such inspection as against the owner shall be at the rate of One Shilling per mile, and shall not exceed Twenty Shillings Sterling in all, and in case such cattle are not too wild, as reported, then the inspection fee shall be paid by the person reporting. If the poundmaster can find any person able and willing to take the cattle to the pound he may engage such person to do so for a fee not greater than that authorised by Section 15, and such cattle shall thereafter be impounded and dealt with as ordinary cattle.

44.—[Poundkeeper to enter description of such cattle in special book.]

45.—[List of cattle to be sent to Colonial Secretary to be advertised.]

46.—*Responsibility for Delivery.*—All cattle so advertised (unless previously claimed) shall be sold by the poundkeeper on the day appointed, as far as possible in accordance with the provisions of Sections 39 and 40 of this Act: Provided, that neither the Government nor the poundkeeper shall be responsible for the delivery to the purchaser of the animal or animals thus sold.

47.—*Proceeds of Sale, how to be applied.*—From the proceeds of the sale of cattle too wild to be driven to the pound the poundkeeper shall, if required, pay to the informant mileage and trespass fees after the rate set forth in Sections 13 and 15 of this Act, and damages which may be claimed in accordance with Section 30: and he shall be entitled to charge for making the necessary entry, and for his trouble in selling such animal or animals, fees as follow:—

	s.	d.
For every horse, mule, or ass	2	6
For every other head of cattle	2	0

And the residue, after the further deduction of not more than Twenty Shillings Sterling for the cost of inspection, shall be paid over in the manner provided in Section 41.

48.—*Poundkeeper's Certificate.*—The poundkeeper shall give to the purchaser a certificate setting forth a detailed description of the animals, the date on which they were sold, and the name and residence of the said purchaser in full, together with the name and situation of the farm on which the animals have been running, and by whom the information has been given; and the person named in the said certificate, or any person deputed by him, may enter on the said farm within one week from the day of sale and remove therefrom the animals described in such certificate.

49.—*Payment of Damages before Removal.*—After such cattle shall have been advertised as set forth in Section 45 no person shall remove any such cattle from the farm on which they may be running until he has first paid all fees and other charges incurred with reference thereto.

50.—*Owner of Stallion, Bull or Ram Trespassing, liable to Fine.*—If any stallion, bull, or ram, the property or in the lawful possession of any person, shall stray upon any private or Crown land, or upon any village or town land not being within the boundaries of any borough or statutory township, such person shall, upon conviction, be liable to a fine not exceeding Ten Pounds Sterling for each stallion, Three Pounds for each bull, and One Pound for each ram; and if such stallion, bull, or ram

shall have come in contact with complainant's horses, cattle, or flocks, he shall be liable to a fine of Fifteen Pounds Sterling for each stallion, Five Pounds for each bull, and Two Pounds for each ram.

51.—[Poundkeeper to advertise particulars of every stallion, bull, or ram impounded.]

52.—*Statement to be furnished to Poundkeeper.*—Any person impounding any stallion running among the impounder's mares, or bull among the impounder's cattle, or ram among the impounder's flocks, shall deliver to the poundkeeper a statement in writing, containing the name of the farm on which and the date when any stallion, bull, or ram was found so running. And every such poundkeeper, after he has ascertained the name of the owner or of the person having lawful possession of such stallion, bull, or ram, shall transmit the said statement, together with the name of the person impounding the said stallion, bull, or ram, and of the owner or person having lawful possession thereof, to the Chief Officer of Police of the district in which the owner of said stallion, bull, or ram, or the person having lawful possession of the same may be resident, or in which the farm may be situate.

53.—*Private Person may sue for Damages.*—Nothing in the foregoing section contained shall prevent any person from suing for and recovering in any competent court any damage he may have sustained by reason of the trespass of any stallion, bull, or ram.

54.—[Poundkeeper to produce books when called upon by anyone.]

55.—[Persons rescuing or attempting to rescue cattle or destroying Pound liable to prosecution.—Fine not exceeding £10, or imprisonment with or without hard labour not exceeding three months.]

56.—*Illegal Seizure or Impounding of Cattle.*—Any person who shall wilfully and illegally seize any cattle for the purpose of impounding the same, or who shall wilfully and illegally impound any cattle, shall upon conviction be liable to a fine not exceeding Ten Pounds Sterling, and in default to be imprisoned, with or without hard labour, for any term not exceeding three months.

57.—If any animal shall be illegally seized or illegally placed in the pound the person so illegally seizing or impounding shall, in addition to any criminal prosecution which he may incur, be liable to the owner to repay or make good all damages, costs, and charges arising out of such illegal seizure or impounding, together with an additional sum of double the amount of the pound fees paid for such animal.

58.—*Poultry and Pigeons.*—Poultry and pigeons trespassing upon and doing damage to any garden, cultivated land, dam, watercourse, corn, or hay, on any private lands, may lawfully be destroyed.

59.—*Application of Act to Pigs.*—This Act shall apply to pigs in

the same manner as it applies to sheep; but this shall not be taken to mean that any provisions which refer specially to rams shall apply also to boars. Every poundkeeper shall set aside a separate enclosure in his pound for pigs, and he shall be obliged to maintain the same in a suitable condition for the confinement and housing of pigs.*

60.—*Rules.*—The Governor in Council may make any rules necessary for carrying out this Act. The contravention of any rule shall be deemed a contravention of this Act.

61.—*Penalties for Contravention.*—For any contravention of any requirement of this Act for which no special provision has been made the person contravening shall be liable to a fine not exceeding Five Pounds Sterling, or in default of payment to imprisonment, with or without hard labour, not exceeding one month.

REFERENCES IN OTHER LAWS.

STOCK THEFTS.

On the subject of ostrich thefts, Section 2 of Act No. 40, 1901 (see Ch. III.) says:—"Upon any charge of theft of ostriches or of ostrich feathers, or of malicious injury to or killing of ostriches or of any offence in respect of ostriches or ostrich feathers, or in any action in which the property in ostriches or ostrich feathers is in question, no exception or defence shall be competent on the ground of any presumption that they are ownerless by reason of the wild nature of ostriches."

POUNDS.

For the observances in connection with outbreaks of lung sickness which the law requires of poundmasters, see Section 30—34 of Act No. 30, 1897 (the full text will be found in Ch. I. (iii.). Lung sick cattle in public pounds must be destroyed, and poundmasters must report the outbreak of disease to the Magistrate or the nearest stock inspector. A declaration must also be made at sales of impounded cattle as to the date when the last case of lung sickness occurred in the pound.

Unbranded sheep found running on any Crown lands, Native location, or commonage, may be impounded if no one can be found to claim the same. See the full terms of this provision in Section 9 of Law No. 48, 1887, in Ch. I. (viii.).

See also Sections 12—15, 20 and 21 of Act No. 1, 1899, in part i. of the present chapter.

* See footnote to Sec. 25.

Chapter V.**THE LAW AS REGARDS DOGS.**

[LAWS.—Section of Law 13, 1874 ; Law 27, 1875.]

One law only is in existence in Natal relating exclusively to dogs, viz., Law No. 27 of 1875, but Law No. 13 of the previous year also contains a clause referring to trespassing by dogs. Under the latter, a dog not having a collar with the name of its owner legibly inscribed thereon can be destroyed summarily if found trespassing; but the possession of a collar may not save the dog if it is found worrying sheep or other animals or pursuing game. The existing dog tax of 5s. per head was imposed by Law No. 27 of 1875; and the same law also defines ownership in respect of dogs, for the purposes of the law—namely, the occupier of the premises, or the headman of the native kraal, as the case may be, where the dog or dogs concerned are permitted to remain, unless they can prove to the contrary.

Law No. 13, 1874.

*“With regard to Trespass on Private Lands.”**

4.—*Dogs Trespassing, may be Destroyed, if Uncontrolled.*—If any dog shall be found trespassing on any farm, estate, land, garden, yard or premises belonging to any person, corporation or company, and at large without being under the immediate custody, protection or control of some competent person, or unless such dog shall have a collar round its neck with the name of its owner legibly engraved or painted in English letters thereon,** and such dog, while so found trespassing and at large, may be immediately killed or destroyed by the owner, tenant, or occupier of such farm, estate, land, garden, yard or premises, or by the agent or servant of such owner, tenant or occupier.

Provided that such collar shall not protect a dog from liability to be destroyed if found worrying sheep or other animals, or pursuing game, or if trespassing upon a farm, and not being then in immediate custody, protection or control of some competent person.†

*This Law is given in full in Chapter VII. : “Fencing, Trespass, and Squatting.”

** In *Cuthbert v. North* the dog had a collar, but without a name on it.

†As amended by Act No. 25, 1899.

LAW No. 27, 1875.

"For abating the nuisance and damage done to property, occasioned by the great number of Dogs in the Colony of Natal."

1.—*Imposition of a Dog Tax.*—There shall be payable to the Government of Natal for all dogs within the said Colony of Natal, a tax of Five Shillings per head per annum.

2.—*Liability for Tax Defined.*—Every person who shall keep or cause to be kept, or have in his possession, care, or charge, any dog or dogs within the said Colony, shall be chargeable with and liable to pay in each and every year during any portion of which he may keep, or cause to be kept, or have in his care or charge, any dog or dogs, for each and every such dog, a tax or sum of Five Shillings: provided, nevertheless, that all dogs under the age of six months shall be exempted from the operation of this Law.

3.—*Governor may order Destruction of Dogs not paid for.*—It shall be lawful for the Lieutenant-Governor at any time by Proclamation to authorise or direct the destruction of any or all dogs for which the aforesaid tax shall not have been duly paid, or of any dogs which, if any registration thereof shall have been by any such Proclamation required, shall not have been duly registered in accordance with any such Proclamation.

4.—*Rules and Regulations.*—It shall be lawful for the Lieutenant-Governor from time to time, and at any time by and with the advice of his Executive Council, to frame and issue by Proclamation such rules and regulations as he may think best as to the time and payment of, and the manner or mode of collection of, the tax imposed by this Law, and of issuing licenses for the same, and as to any required registration of dogs thereunder, and to appoint any officers or other persons for the collection thereof; and to impose by such rules or regulations any penalties not exceeding three pounds, on every person failing to comply with this Law, or with any such rules or regulations, and for all other matters and things which may be requisite or necessary in order to give full force and effect to the provisions of the Law.

5.—[Collection of Tax in Boroughs.]

6.—*Evidence in action for Damages done by Dogs.*—In suing for damages for injury done to horses, cattle, goats, sheep, poultry, or other live stock by dogs, it shall not be necessary for the person seeking such damages to show a previous mischievous propensity in the dog or dogs causing the injury, or the owner's knowledge of such previous mischievous propensity, or that the injury was attributable to neglect on the part of such owner.

7.—*Ownership of Dog defined for purposes of this Law.*—The occupier of any house or premises and the headman of any Native kraal where any dog is kept or permitted to live or remain shall be deemed to be the owner of such dog for the purposes of this Law, unless the said occupier or headman can prove that he is not the owner of such dog, and that such dog was kept or permitted to live or remain in the said house, or premises, or Native kraal without his sanction or knowledge.

8.—*Owner of Dog to produce License when required.*—Every person having in his possession or custody any dog or dogs shall produce the license for such dog or dogs whenever so required by any Resident Magistrate, Fieldcornet, Police Constable, or owner or occupier of the farm on which such person resides, and shall in case of neglect or refusal, if licensed, be liable to a penalty of Five Shillings, or in default of payment be imprisoned for any period not exceeding seven days.

9.—*Operation of this Law.*—This Law shall be in force and extend only to such divisions, counties, or districts as the Lieutenant-Governor, by and with the advice of his Executive Council, shall by Proclamation declare to be under the operation of the Law, and the Lieutenant-Governor, by and with the advice of the Executive Council, may from time to time exempt, by Proclamation, any division, county, or district from the operation of this Law, and may from time to time include within the operation hereof any division, county, or district as may from time to time be found expedient.*

[Dated 17th Dec., 1875.]

RULES MADE BY HIS EXCELLENCY IN COUNCIL.

Under Section 4, Law 27, 1875.—Government Gazette, 29th March, 1887.

2. Every dog above the age of six months shall be licensed and wear a numbered collar or strap.

3. The tax of Five Shillings imposed under the Law shall be paid to the Magistrates or to persons appointed by them for the receipt and collection of the same, and shall be deemed to be payable for and in respect of the year during which it shall be paid.

*The provisions of this Law were extended to the whole Colony, except Maritzburg, Durban, the Northern Districts and Zululand, by a Proclamation appearing in the *Government Gazette* for Nov. 11, 1879. The Northern Districts were included in 1904 (see Proc. 60 in G.G. June 7, 1904) and Zululand in the same year also (see Proc. 121 in G.G. Nov. 22, 1904). For the application of the Law in Pietermaritzburg, see Proc. in G.G. Nov. 11, 1879, and Regulations in G.G. March 4, 1884; as regards Durban, see Procs. in G.G. Nov. 23, 1880, and Dec. 11, 1894.

[Destruction of Dogs authorised as follows:—Divisions of Klip River, Newcastle, and Umsinga, Proc. in G.G. June 28, 1881; Maritzburg, Proc. in G.G. May 20, 1884; Ladysmith, Proc. in G.C. March 28, 1893; Borough of Newcastle, Proc. in G.G. May 9, 1893.]

4. The owner or person in charge of every dog above the age of six months shall take out or procure from the Magistrate, or other person appointed by him, as in the foregoing rule provided, a collar or strap bearing a number or having a numbered plate attached thereto, which he shall cause to be fastened to, or worn by such dog.

5. The Magistrates, or other person, shall issue to applicants a license, as per form annexed, for each and every dog for which a numbered collar or strap has been previously issued; and such license shall specify the number of the said collar or strap, and shall be in force no longer than the 31st day of December next ensuing on the date of the issue thereof.

6. Every such license shall be renewed at the expiration thereof, upon the production by the person applying to the Magistrate, or other Officer, of the expired license or the numbered collar or strap in respect of which the renewal is required.

7. It shall not be necessary for the Magistrate, or other person, when renewing the license, to issue a fresh collar or strap, unless the one previously issued shall be proved to have been lost or destroyed.

8. No dog shall be considered licensed unless the number of the collar or strap worn by such dog shall correspond with the number specified in the license held by the owner or person in charge of the same.

9. Nothing in these rules shall prevent the transfer of the numbered collar or strap from any one dog to any other dog, or the removal of a licensed dog from one ward or district to any other ward or district.

10. Every person contravening or failing to comply with the requirements of these Regulations shall be proceeded against summarily, in the Court of the Resident Magistrate having jurisdiction, upon the complaint or information of any person, and shall, upon conviction, be liable to any penalty not exceeding £3 Sterling.

11. The Lieutenant-Governor may authorise one or more persons to act as Inspectors for each ward or other district within the operation of the Law, whose duty it shall be to visit each house, kraal, or other dwelling, at least once in each year, ascertain the number of dogs kept thereat, and examine all licenses and collars, and any person obstructing or in any way hindering the person so authorised, in the execution of his duty, or failing to assist him when called upon to do so, shall be deemed to have contravened these Regulations. And the persons so authorised as Inspectors shall, as soon as may be, report to the Resident Magistrate having jurisdiction all contraventions or infractions of these Regulations or of the Law under which they are issued.

FORM OF LICENSE.

LICENSE.

(Under Law No. 27, 1875.)

No.

..... 19 .

This is to license and authorise
residing at
in the Division of
to keep the dog wearing the collar or strap numbered
from this date to the 31st day of December next.

Issuing Officer

Ward or District No.

in the Division of

Chapter VI.

ROADS, TRAFFIC, AND OUTSPANS.

[LAWS. — *Roads and Road Boards*: Law 9, 1870; Law 19, 1875; Act 35, 1901. *Traffic*: Law 13, 1865; Law 13, 1874. *Fencing Public Roads*: Act 9, 1902. *Outspans*: Law 9, 1870; Law 14, 1872; Act 15, 1896.]

The construction and maintenance of main roads is provided for by Law No. 19, 1875. The Chief Engineer of the Public Works Department is empowered to take land for the purposes of main roads, which land, however, shall not exceed one hundred feet in width. He may also enter upon any land where there may be suitable materials for road construction. Compensation is provided for in cases where actual loss occurs to the owner thereby, as well as for any damage sustained in connection with the camping of road parties. For the purpose of adjudicating in cases of dispute with by-roads, Road Boards may be formed, under Act No. 35, 1901, which deals fully with the constitution of such Boards, their jurisdiction and powers. This Act also deals with unauthorised interferences with by-roads, and also with the erection of gates and their use.

The fencing of public roads, and the provision of gates thereon, is dealt with by Act No. 9 of 1902.

Two Laws are in existence for the regulation of traffic on public roads—Law No. 13 of 1865 and Law No. 33 of 1874. The former deals more with the direction of traffic, that is to say, with a view to providing for the safety of persons using such roads; whilst the latter provides for the closing of old roads and the opening of new ones.

The principal outspan law is Law No. 9 of 1870. This law empowers the Governor, upon petition from the owner of a farm, to set aside a piece of land on such farm for outspan purposes, whereupon the remainder of the farm becomes freed from general servitude of outspan. Until such steps are taken to provide for a public outspan, no owner or occupier of a farm subject to right of outspan can prevent any person from outspanning on any part of that farm, so long as he does not camp within 300 yards of the homestead, and making use of any uncultivated land on the farm for grazing his animals. All Crown lands are subject to the servitude of outspan, as are also Native reserves, under certain conditions (see Section 18).

Under Act No. 15, 1896, the Government may, if deemed necessary, lay out an outspan on any farm, at an annual rental, until such time as the owner of the farm may lay off an outspan in terms of Law No. 9 of 1870. Such outspans as the Government may lay off are to be fenced by and at the expense of the Government.

C.—ROADS AND ROAD BOARDS.

LAW NO. 19, 1875.

“To Provide for the Construction and Maintenance of the Main Roads of the Colony.”

1.—[Power given to the Civil Engineer (*i.e.*, Chief Engineer, P.W.D.) to enter upon Crown lands, and take materials for public works.]

3.—*Width of Main Roads.—Materials.*—No land to be taken for the purposes of any Main Road shall exceed one hundred feet in width, and except as hereinafter mentioned all material (wood or timber excepted) raised and carried away to be employed in the construction and repair of any Main Road, or of any Bridge, Culvert, Drain, Watercourse, or other work connected with or forming part of the said road, shall be employed and used only in the construction and repair of so much of the road, or of any of the aforesaid works, as lie and are situated within the boundaries of the original grant from which the material has been raised:

(*Proviso re Compensation*): Provided that no land be taken or materials be raised or carried away as aforesaid upon which any building may actually be thereon erected without compensation to the proprietor; and that no land be taken or materials raised and carried away without previous notice to the proprietor thereof, by transmitting the same through the Post Office, addressed to said owner's last known place of abode: Provided also that, should the proprietor or occupier object to such materials being raised or taken, such objection shall be referred to the decision of the Resident Magistrate, who, after inspection and investigation, shall make such order thereon as to him may seem fair and just.

4.—*Where Materials are not Obtainable on Land through which the Road runs.*—The said Civil Engineer or the Officer acting as such for the time being, and all persons authorised thereto by him, shall have power and authority, should no serviceable material for constructing or repairing any of the Main Roads be found within the boundaries of the original

grant through which lies that portion of the Main Road to be constructed or repaired, to enter upon any land and wherever found to raise and carry away such materials as hereinbefore provided: Provided always that whenever such materials are carried away from land over which no such rights as aforesaid have been reserved, or from land that the Government may have a legal right to use, but which has been improved by cultivation, irrigation, or otherwise, the said Civil Engineer, or other Officer as aforesaid, shall treat and agree with the proprietor thereof in manner provided by the 5th, 6th, 7th, and 8th Sections of this Law, and in other respects deal with the said proprietor or with the said land as in the said sections provided and set forth.

5.—*In what cases an Agreement for Purchase or Hire must be made.*—If the aforesaid Civil Engineer or the Officer acting in that capacity for the time being, should require to take or use any land for the purpose of a Main Road, or to dig, get, or carry away any materials for constructing and repairing the said road, over which land no such rights as aforesaid have been created or secured, and belonging to any person who may think proper to require compensation from the said Civil Engineer, or if he should require to use any land or to take materials from any land that the Government may have a legal right to use, but which has been improved by cultivation, irrigation, or otherwise, he may treat and agree with every such person for the purchase or hire, as the case may be, of any such land or materials, and may enter into any contract relative to the obtaining of such land or materials, and for compensation for the use of such improved land upon such terms and conditions as he shall judge expedient.

9.—*Punishment for Obstructing Officers or Injuring Public Works, etc.*—If any person shall wilfully prevent or assault, or threaten to assault, or obstruct the said Civil Engineer or any surveyor or contractor in the execution of his duty, or any person or persons employed by proper authority and acting within the powers conferred by this Law, in surveying or measuring or laying out any line intended for a main road, or in entering upon any land for the purposes of this Law, or if any person shall wilfully destroy, pull up, or in any way injure any instruments or implements used in public works, or any road work, bridge, culvert, drain, watercourse, or other work whatsoever, every person so offending shall forfeit and pay for every such offence, upon conviction before the Court of any Resident Magistrate, any sum not exceeding Ten Pounds Sterling, or in default of payment shall suffer imprisonment, with or without hard labour, for any term not exceeding three months.

10.—*Erection of Temporary Dwellings for Road Parties.*—It shall be lawful to erect tents, huts, or other temporary dwellings upon any

land contiguous to any Main Road for the use of the workmen and all other persons employed in and about the construction and maintenance of any Main Road, and to outspan thereon all wagons and carts used in and about the works, and to depasture all horses and cattle upon the land over which the said Main Road may run, and upon the construction and maintenance of which the said cattle and horses may be employed for a reasonable time: Provided always, that the owner of the said land suffer no damage by reason of the grazing upon his lands of the said cattle and horses, without being entitled to demand and obtain reasonable compensation for the same, to be determined by arbitration in the manner as hereinbefore provided: Provided also that any objection of the owner or occupier of the land to the site chosen for the erection of the said huts, tents, or other temporary dwellings, shall be referred to the Resident Magistrate of the County or Division, who shall make such order thereon as he may deem fair and just.*

[Dated 17th Sept., 1875.]

LAW No. 9, 1870.

*"For regulating places of outspan and the rights of travellers with respect to roads and outspan places."***

15. All the public roads shall be deemed, and are hereby declared, to be 100 feet wide: and if unfenced, loose cattle and horses being driven along any public road may travel on either side of such road to a distance of at least 100 feet without being liable for trespass or for injury done to crops within that distance: Provided the provisions of this clause shall not apply to any road which has been laid out upon the authority of the Surveyor-General or Civil Engineer for the Colony, if of a less width than 100 feet along that portion of the land which shall have been fenced previous to the passing of this Law.

*See Law No. 9, 1870 (Part IV. of the present Chapter), Section 12 of which reads:—"Government parties, when employed in the construction or repair of public roads running through any private lands, shall have the right to outspan on any to them convenient spot on or near the road, not being within three hundred yards of any dwelling house, and to graze their cattle on all adjoining grass lands if unenclosed."

**The full text of this Law will be found in Part IV. of the present chapter—"Outspans."

Act No. 35, 1901.

"To repeal and re-enact with amendments the Road Board Law, 1888."
Short Title: "The Road Boards Act, 1901."

[NOTE.—This Act is divided into three Parts, dealing respectively with the constitution of Road Boards, the jurisdiction and powers of Boards, and "miscellaneous provisions." Much that is contained in those several parts is not of sufficient general interest to warrant reproduction here in full, and consequently only those sections that are deemed of general interest are given here. For the rest a summary will, it is thought, suffice.*]

Part I.—Constitution of Road Boards.

SUMMARY OF SECTIONS 3—16.—Each Magisterial Division may have a Road Board of its own, consisting of six members, including the Magistrate as chairman, and with the Clerk of the Court as clerk to the Board. Elections of members are held every third year. The date of the election is fixed by the Magistrate, but must not be later than the 14th December. No person can vote or stand for election unless his name appears on the Voters' Roll and unless he owns landed property other than town lands or town or village property. If less than the required number of members is elected, the Governor may appoint the remaining number necessary. Expenses incurred in connection with elections are paid out of the general revenue of the Colony.

Part II.—Jurisdiction and Powers of Road Boards.

17.—*Meaning of "by-road."*—The expression "by-road" as used in this Act means:—

- (a) A road or right-of-way, whether public or private, which has been established, or the right of which has been created, by prescription or by deed, or in any other valid manner.
- (b) A way of necessity, including a reasonably necessary means of access to a public road or a railway station, stepping place, or siding.
- (c) Foot or bridle path.

From the above definition there shall be excluded all roads maintained by Government, and also any road or right-of-way or way of necessity, in so far as it lies within the limits of any borough or township, or of the commonage or other public lands attached to a village.

*No responsibility, however, is assumed by the compiler for the accuracy or comprehensiveness of these summaries, they being given merely with a view to indicating the general trend of the law on the matters in which they deal.—H.J.C.

18.—*Exclusion of Road taken over by Government.*—When any road is taken over and maintained by the Government, the Minister of Lands and Works shall publish a notice thereof in the *Government Gazette*, and such road shall thereupon be excluded from the operation of this Act unless and until the Minister shall by a like notice declare that the road has ceased to be maintained by the Government.

19.—*Alteration of by-road.*—A Road Board shall have power to hear and decide all cases of dispute or question referring to the opening of by-roads or the keeping open of existing by-roads, the closing of such by-roads as may be no longer needed, and the making of alterations in by-roads.

When the opening of a by-road as a way of necessity is ordered, the Road Board may award to the persons through whose land the by-road passes such compensation as may be fair and reasonable.

20.—*Gates on By-Roads.*—A Board shall also have power to hear and decide any disputes with reference to the erection of gates upon by-roads, and the character and construction of such gates, subject always to the provisions hereinafter contained, and to adjudge any of the parties to the dispute who may be benefited by such gates to contribute a reasonable share of the cost and upkeep thereof.

21.—*Fences along Roads; Maintenance of By-Roads.*—The Road Board shall also have power to permit or order a by-road to be fenced on either or both sides, and to determine the character and construction of such fence, and, when a fence is ordered to be erected, to determine by whom of the parties and in what proportion the cost of erection and up-keep shall be borne.

22.—*Recovery of Compensation for other Payment.*—The Board may also determine, as between the parties to a dispute, by whom and in what proportion the cost of payment ordered to be made by the Road Board may be recovered by the issue of a writ, as in the case of a judgment of the Magistrates' Courts.

23.—*Direction and Width of By-Road.*—A Road Board may also define and determine the direction and width of any by-road already existing or hereafter to be opened up or altered under the provisions of this Act: Provided that no by-road shall exceed 30 feet in width: And provided further that no increase shall be made in the width of any such by-road passing through or between any gardens, cultivated land, or orchards, or between buildings or homesteads.

24.—*Powers of Magistrate pending hearing by Board.*—Pending the hearing of any question by the Road Board the Magistrate shall have power, on the application of any person interested, and if it shall appear to him necessary, to summarily order the opening of any by-road which

may have been stopped, or in which any deviation has been made, or which has been otherwise obstructed, any person closing up or obstructing such by-road or otherwise acting in disregard of the order shall be guilty of contempt of Court.

[SUMMARY OF SECTIONS 25—32.—Meetings of the Board may be convened upon application in writing of parties aggrieved, such application to be accompanied by deposit of such sum as the Magistrate may require, from £15 to £25. The time and place for such meeting shall be duly published. Witnesses may be subpoena'd in the usual way. The Magistrate shall be chairman, and four members exclusive of the Magistrate shall form a quorum. Evidence by witnesses must be given upon oath. The Board may impose any fine up to £10 on any witness disobeying subpoena.]

33.—*Personal Inspection of Roads.*—The Board may, if they deem it necessary, make a personal inspection of the road or roads in dispute, or any depute a Committee of their own body, not less than two in number, to visit the spot and report to the Board the result of their enquiries.

35.—[Disqualification of member for interest in case before Board.]

39.—*Agreement to make the Board's Decision Final.*—It shall be lawful for the parties to any dispute before a Road Board, if all the parties shall so agree, to enter together into a written agreement that the decisions of the Road Board shall be final and conclusive in all respects, both as to the subject matter of the dispute and as to costs; and whenever an agreement shall have been so made the decision of the Road Board shall be final, and shall bind all the parties, and there shall not, so far as it affects any of the parties to such agreement, be any appeal from such decision to any Court.

40.—*Notification of Decision.*—As soon as may be after the decision of the Board has been given, the Magistrate shall notify twice in the *Government Gazette*, and in each of two newspapers circulating in the district, that the proceedings and decision are open to inspection at his office, and that unless appealed from within one month from the date thereof (which date shall be specified in the notice), the decision of the Board shall become final.

41.—*Appeal to Supreme Court.*—It shall be competent for any person affected by the decision of a Road Board to appeal to the Full Bench of the Supreme Court: Provided that if the person desirous of appealing shall not have been one of the parties to the proceedings of the Road Board, he shall before taking out the writ of appeal be required to deposit the sum of Fifteen Pounds Sterling, with the Clerk of the Road Board, as security for the costs of appeal.

45.—*Powers of Supreme Court in Appeal.*—The Court may revise the proceedings, and may confirm, reverse, alter or correct the decision, or may remit the case for further enquiry or hearing, and may give any necessary instruction for the guidance of the Board, or make such order thereon as shall seem proper: Provided that no order or decision of the Road Board shall be liable to be reversed upon a question of fact or by reason of any irregularity or defect in the record of proceedings, unless it shall appear to the Supreme Court that a failure of substantial justice has, in fact, resulted therefrom, or that any person, not being a party to the case, may be prejudiced thereby.

46.—*Judgment of Supreme Court Conclusive.*—The judgment of the Supreme Court shall be conclusive and binding upon the Board and the parties.

50.—*Laying off Roads.*—When the decision of the Board has become final as aforesaid, the Board, or the Magistrate on their behalf, may employ a Government Surveyor to lay off by survey any road or roads authorised or defined by the decision or judgment on the plan or diagrams of the land in the Surveyor-General's Office, and such surveyor shall certify that the road or roads have been laid off in accordance with the decision of the Board.

51.—*No Costs as between Parties save in certain cases.*—No costs shall be awarded by the Board as between the parties unless the Board shall be of opinion that the application or the defence was frivolous or vexatious.

Subject as aforesaid the Board may decide as to the cost of the enquiry, the record of the same, the expenses of advertising and of the survey, advocates' and attorneys' charges, and all other costs incidental to the cause, and by which of the disputants they shall be paid.

Part III.—Miscellaneous Provisions.

52.—*Stopping Existing Roads.*—No person shall close, break up, whether by ploughing or otherwise, or in any way injure an existing by-road, unless he shall for at least a month before doing so, erect at either end of the by-road or right-of-way intended to be closed, a notice board intimating his intention to close the same, and unless he shall also obtain the permission of the District Inspector or other Officer of the Department of Public Works being in charge of the roads in the district.

53.—*Penalty for Closing By-road.*—Any person who shall close a by-road in contravention of the preceding section shall be liable to a fine not exceeding Twenty Pounds Sterling.

54.—*Saving of Authority of Road Board.*—Nothing in this Act shall

be deemed to affect the jurisdiction of any Road Board to order the closing of a road, or to authorise any person to close a road which has been opened by order of the Road Board.

55.—*Gates on By-roads.*—Whenever the proprietor (which expression shall include a tenant or occupier) of any land over which a by-road shall pass shall be desirous of fencing such land, he shall be at liberty to do so, if he provides swing gates in such fencing so as to allow persons entitled to use such by-road free access thereto; and such gates shall at all times be kept in proper repair by the proprietor. Such gates shall be folding gates, and be swung, and have proper fastenings, and shall be of such width and construction as the Road Board shall determine.

Any gates erected before the passing of this Act, if coming within the definition of this Act, shall be considered as erected under this Act.

56.—*Division of Cost of Gates in Dividing Fence.*—When a dividing fence crosses a by-road or right-of-way, it shall be competent for any one of the proprietors of land on either side of such dividing fence to erect swing gates in terms of this Act, and to recover from the adjoining proprietor one-half the cost of such erection, without prejudice to the liability of any other person who may be ordered by the Board to contribute towards the expense of the erection and up-keep of such gate.

57.—*Gates to be Closed.*—Every person, not being the sole proprietor, or having his authority, who shall pass through any gate provided in pursuance of this Act, shall, immediately after so passing through the same, with or without any vehicle or animals in his care, close and fasten such gate, or cause the same to be closed and fastened, under pain of a fine not exceeding Five Pounds.

58.—*Penalty for Wrongfully Opening Gates.*—Any person, not being the sole proprietor, or having his authority, who shall open or unfasten any gate erected or provided in pursuance of the provisions of this Act, except for the purpose of then and there passing through the same with or without any vehicle or animals in his care, or of enabling some other person or persons so to pass, shall be liable to a fine not exceeding Ten Pounds, or in default of payment thereof, to imprisonment, with or without hard labour, for any term not exceeding two months.

59.—*Actions for Damage through leaving Gates Open.*—Nothing in this Act contained shall prevent any person who deems that he has sustained loss or damage by or in consequence of the leaving open of any gate erected in accordance with the provisions of this Act from bringing an action for the recovery of such loss or damage.

60.—*Regulations.*—The Governor in Council may from time to time

make regulations for the purposes of this Act, and may by any such regulations appoint penalties for the contravention thereof not exceeding Ten Pounds Sterling.

[Dated 26th Aug., 1901.]

II.—REGULATION OF TRAFFIC.

LAW No. 33, 1874.

“To empower the Lieutenant-Governor to declare and define the Main Roads within the Colony; and to regulate the Traffic upon such Roads.”

Short Title.—“The Traffic Regulation Law, 1874.”

2.—*Main Road.*—The term “main road” means all trunk or other roads constructed or maintained by Government.

3.—*(Main roads to be defined by Proclamation.)*

4.—*Traffic may be stopped on main road when another and sufficient one has been opened.*—The Governor may stop the traffic along any main road or part thereof, when a sufficient road has been opened by which traffic can reach its destination as it would have done had the main road been open. Notice will be printed in the *Government Gazette* and posted in a conspicuous place at each end of the road indicated.

5.—*(Traffic may be regulated upon roads when there are two from one point to another.)*

6.—*(Seven days’ notice must be given in the local newspapers of the stoppage or regulation of traffic as in two last preceding sections, and a notice must be posted at each end of the road in question.)*

7.—*Vehicles not to use the Road, except as indicated.*—When and as often as the traffic on any main road shall have been declared as aforesaid to be regulated or stopped, no wagon or other vehicle drawn by any animal shall be allowed to pass or be driven over or along the road, or any portion thereof, over which the traffic has been declared to be regulated or stopped, otherwise than as by proclamation or notice is set forth, and all vehicles passing over or along such road may be stopped by any person authorised thereto by the Civil Engineer of the Colony; and any person driving, or in any way assisting in driving, any wagon or other vehicle along or over such road as aforesaid, shall on conviction forfeit and pay a penalty not exceeding Five Pounds for every such offence, and in default of payment suffer imprisonment for any period not exceeding one month.

LAW No. 13, 1865.

"To regulate the Employment of Wagons and other Vehicles on the Public Roads and Streets within the Colony of Natal."

1.—*Owner's Name to be Painted on Wagons.*—The owner of every wagon, cart or other vehicle used on any public road or street, shall affix or paint, or cause to be affixed or painted, in one or more straight lines, in legible letters, not less than one inch in height, upon some conspicuous part of the wagon, cart, or other vehicle, together with a number on each wagon, cart, or other vehicle, his surname, with his Christian names or the initials thereof, and also his address: Provided that nothing in this clause shall be construed to extend to any wagon, cart, or other vehicle used solely for conveyance of private persons or passengers.*

2.—*Furious or Careless Driving Punishable.*—Any driver, leader, or other person who shall drive any wagon, cart, or other vehicle, or shall ride or drive any horse or animal so carelessly, recklessly, furiously, or negligently as to cause hurt or damage to any person, or any wagon, cart, or other vehicle, or to any goods conveyed in any other wagon, cart, or other vehicle, or so as to endanger the safety of any person, animal, wagon, cart, or other vehicle shall, upon conviction, forfeit a sum of money not exceeding £5 (Five Pounds).

3.—*Rules for Vehicles, etc., passing each other.*—All drivers, leaders of wagons, etc., and horsemen shall keep on the left or near side of the road when meeting or being followed by wagons, horsemen, etc., etc., and no driver or leader of wagon, or person driving cattle, shall unnecessarily prevent the passage of any other cart, wagon, etc.

4.—*No Person to crack whips while horses, etc., are passing.*—No person shall crack any whip in any street or borough or town, or on any road, while any vehicle drawn by horses or mules, or any person riding, is passing, near or close to such person having a whip.

5.—*Wagons, etc., to have Brake and Chain.*—Wagons to have brake and chain, and every cart and vehicle (except private conveyances) to have brake and chain sufficient for purposes.

6.—*Size of Brakes.*—No wagon, cart, or other vehicle used on roads, or on any street, shall have brakes extending further on either side than six inches beyond the wheels thereof; and no wagon, cart, or other vehicle used as aforesaid, shall apply or use on any road or street any wooden drags commonly called Rem Schoens.

*As amended by Act No. 11, 1906.

7.—*Ox wagons to stop till wagons drawn by horses pass.*—Wagons and carts drawn by more than two oxen and not having voorlooper leading shall, when meeting any vehicle drawn by horses, be compelled to stop until such other vehicle shall have passed.

8.—*Wagon-drivers breaking open boxes, etc., punishable with imprisonment, etc.*—Any wargon-driver, leader, or any other person employed in or about any wagon, vehicle, etc., who shall unlawfully break open any portmanteau, casket, bag, box, chest, bale, case, jar, or any other packet or parcel, or tap or bore any cask, barrel, or the like, or uncork any bottle or flask which may have been entrusted to himself or any other person, or may be under the charge of the owner thereof, for or in order for conveyance or transport in any wagon, cart, etc., shall be liable to a fine of Five Pounds, or imprisonment for three months, with or without hard labour.

9.—[Repealed by Law No. 31, 1874.]

10.—*Acts of Omission and Commission Contraventions.*—Every breach of this Law, or any part thereof, and the omission to do any act, matter, or thing required to be done, and not so done under and in strict accordance with the provisions hereof, shall be deemed and taken to be contravention of this Law.

12.—(Governor may make bye-laws respecting traffic on bridges. Bye-laws to be published in *Government Gazette* and also displayed on notice boards to both sides of bridge in question.)

13.—*Rules for Passing Dangerous Places.*—Should any vehicles be passing along any steep hill, cutting, or dangerous place, the vehicle coming down shall be obliged to stop at the most convenient place on either side of the road, and allow sufficient space for the vehicle going up hill to pass; but should the driver of a horse or mule conveyance wish to pass a vehicle drawn by oxen going in the same direction, he may do so, after having called upon the driver of the last-mentioned vehicle to stop.

14.—*Natives Carrying Wood, etc., to Leave the Road.*—Natives passing along the roads carrying wood, or being dressed in their dancing or war costumes, whenever any person on horseback or with a wagon, etc., approaches them shall leave the road, and shall not by any shouts or actions frighten the animals being driven or ridden.

16.—*Penalties.*—For any contravention of this Law for which no special fine or other punishment is provided, the party, for every such contravention, shall forfeit Ten Pounds Sterling, or in default be committed to gaol for any period not exceeding three months.

III.—FENCING OF PUBLIC ROADS.

Act No. 9, 1902.

“To regulate the Fencing of Public Roads.”

1.—*Repeal.*—Section 44 of the Fencing Law, 1887, is hereby repealed.

2.—*Interpretation.*—In this Act the expression “Public Road” means a public road maintained by Government, but not being a main trunk road proclaimed to be such, as hereinafter provided. The word “proprietor” includes a tenant or occupier.

3.—*Erection of Gates over Public Roads.*—It shall be lawful for the proprietor of any land over which a public road passes to erect gates over such road subject to the provisions of this Act, but not otherwise.

4.—*Notice of intention to erect Gates.*—A proprietor wishing to erect gates over a public road shall give a month’s notice in writing to the Chief Engineer, Public Works Department (who is hereinafter referred to as the Chief Engineer), and shall publish a notice of his intentions at least twice in a newspaper published in the Colony, the first publication being not later than one week after the notice to the Chief Engineer. Such notice shall as closely as may be follow the form of the schedule of this Act, and shall contain as precise a description as possible of the site of the intended gates.

5.—*Notice of Objections.*—Any person having objections to the erection of the proposed gates shall notify the same in writing to the Chief Engineer and the proprietor of the land on which it is proposed to erect such gates.

6.—*Enquiry by Chief Engineer.*—The Chief Engineer shall make any enquiries he may think necessary, and shall take into consideration any objection lodged with him, and if he thinks any objections important he shall allow the applicant an opportunity of answering them, and if he shall think fit he may call the parties before him at such place as he may appoint.

7.—*Decision by Chief Engineer.*—The Chief Engineer shall give his decision on any application in writing, and shall state the grounds thereof, and the decision shall be notified to the parties.

8.—*Refusal of Permission.*—Permission to erect gates shall be refused unless in the opinion of the Chief Engineer their position or other circumstances will not render them dangerous or otherwise detrimental to the public interests.

9.—*Appeal to Minister.*—If any person interested is aggrieved by the decision he may appeal to the Minister in charge of the Department of Roads, whose decision shall be final.

10.—*Gates not to be Erected without Permission.*—No gates shall be erected upon a public road unless and until the application therefor shall have been granted.

11.—*Joint Application.*—In the case of a road which divides the lands of different proprietors, such proprietors may combine in an application for leave to erect gates.

12.—*Character and Construction of Gates: Upkeep.*—Gates erected under this Act shall be swing gates sufficient to allow the reasonable free use of the road, having regard to the traffic thereon; such gates shall have a balance catch or other free fastener, and shall be of such width and construction as the Chief Engineer shall determine. They shall at all times be kept in good order by the proprietor at his own expense.

13.—*Liability of Proprietors.*—The proprietor shall be liable for any accident, loss, or injury arising from the negligent or wrongful use by him or his agents or servants of any gates erected over a public road, or from the gates or any accessory thereof being in bad repair, or defective in construction or condition.

No liability shall attach to the Colonial Government or to the public revenue by reason of any accident, loss, or injury arising from any of the aforesaid causes.

14.—*Compulsory Repair or Alteration.*—If the proprietor fails to keep any gate and its approaches in good condition, both as to construction and repair, it shall be lawful for the Chief Engineer, or any officer deputed by him for that purpose, after one week's notice to the proprietor, or earlier if there be pressing cause, to make or cause to be made any necessary repairs or alterations, and he may recover the cost thereof from the proprietor in the Magistrate's Court.

In the event of any repeated or combined misuse or neglect or defect in connection with such gates the said officer may, upon notice to the proprietor, apply to the Magistrate for an order for the removal of the gates without compensation or for any other order which may appear proper.

15.—*Exclusion of Main Trunk Roads.*—No gates shall be erected upon any main trunk road.

16.—*Creation and Disrating of Main Trunk Roads.*—The Governor in Council may from time to time, by Proclamation, declare any road to be a main trunk road or may similarly declare that any main trunk road shall cease to be such from a date specified in the Proclamation.

17.—*Removal of Gates on Proclamation of Main Trunk Road.*—Whenever a road upon which gates are erected is proclaimed as a main trunk road, the proprietor shall remove the same within one month after

receiving notice from the Chief Engineer to do so, or within such further time as the Chief Engineer may in writing allow.

18.—*Removal of any Gate by order of Chief Engineer.*—The Chief Engineer shall be entitled at any time to order the removal of any gates which may be erected under this Act, or which may have been erected before the passing of this Act, over a public road, and within one month after receiving notice to that effect the proprietor shall remove the gates specified in the notice.

19.—*Gates Erected before Proclamation of Public Road.*—Whenever any by-road, on which gates shall have been erected, shall be proclaimed as a public road, the Chief Engineer may allow such gates to remain, provided they in all respects comply with the requirements of this Act, and in such cases all the provisions of this Act shall apply to such gates.

20.—*Closing and Fastening Gates.*—Every person not being the sole proprietor or having his authority, who shall pass through any gate provided in pursuance of this Act, or to which this Act shall apply, shall immediately after passing through the same with or without any vehicle or animals in his care, close and fasten such gate, or cause the same to be closed and fastened under pain of a fine not exceeding £5, or in default of payment thereof to imprisonment, with or without hard labour, for a term not exceeding one month.

21.—*Offence of Unlawfully Opening Gates.*—Any person not being the sole proprietor, or having his authority, who shall open or unfasten any gate provided in pursuance of this Act, or to which this Act shall apply, except for the purpose of then and there passing through the same with or without any vehicle or animals in his care, or at the request of some person or persons then and there desiring so to pass, shall be liable to a fine not exceeding £10, or in default of payment thereof to imprisonment, with or without hard labour, for a term not exceeding two months.

22.—*Jurisdiction.*—All contraventions under this Act shall be cognisable in the Magistrates' Courts.

23.—*Saving of Claims for Damages.*—Nothing in this Act contained shall prevent any person who deems that he has sustained loss or damage by or in consequence of the leaving open of any gate erected in accordance with the provisions of this Act from bringing an action for the recovery of such loss or damage.

SCHEDULE.

Notice is hereby given, that it is my intention to erect gates upon the farm, across the public road from to, at the following point (*here describe as accurately as possible the site of the intended gates*).

Notice of any objections must be given in writing to the Chief Engineer, Public Works Department, Pietermaritzburg, and to me, on or before the (*here specify the date of the expiry of the notice to the Chief Engineer*).

(Name)

Address

IV.—OUTSPANS.

LAW No. 9, 1870.

“For Regulating Places of Outspan, and the Rights of Travellers with respect to Roads and Outspan Places.”

1.—*Application for Outspan Place.*—It shall be competent for the owner of any farm or piece of land, subject to the right of outspan, to apply by memorial to the Lieutenant-Governor, praying that a particular portion of such farm or piece of land may be set apart for the purpose of outspanning, and for no other purpose whatsoever: Provided, nevertheless, that nothing in this law contained shall prevent the owner or occupier of such farm or piece of land from using for grazing purposes such portion when so set apart as an outspan place in such manner as not to injure or prejudice the using of such outspan places by travellers for the purposes of outspan.

2.—*Inspection of Locality Indicated.*—Upon receipt of any memorial or application for the setting apart of an outspan place, as provided for in the above clause, the Lieutenant-Governor shall cause the locality therein referred to to be inspected by the Field Cornet of the ward in which the land is situated, or by the Resident Magistrate of the county, or some other competent person, who shall thereupon recommend the specific situation and extent of the portion to be set apart as aforesaid for the purposes of outspanning, and who shall duly report the result of his inspection for the Lieutenant-Governor's information and decision: Provided that the proportion of not less than four acres, and not exceeding five, to every one hundred acres of the farm, shall be set apart for such outspan place, except as otherwise provided in Clauses 7 and 9 of this Law.

3.—[Upon receipt of such report, Governor to cause notice to be published in *Gazette* inviting objections. At expiry of notice, the Magistrate to forward any objections, and his report thereto, to Colonial Secretary.]

4.—[Governor may then, after enquiry, require the owner to have an outspan place surveyed, and, after survey, may establish the same by proclamation in *Gazette*.]

5.—*Defining and Registering Outspan.*—After the issue of any proclamation establishing an outspan place, the extent of such place of outspan, and its figure and situation relatively to the other boundaries of the said farm or piece of land, shall be carefully certified in the office of the Surveyor-General in the usual manner, and shall be represented by a diagram or plan in the said office, free of any office fee or charges, and it shall then be incumbent upon the owner or owners of such farm or piece of land to fix the boundaries of such outspan place by proper beacons, which shall be at least three feet in height, and shall in the upper foot thereof be conspicuously painted or plastered with some permanent colour, and distinguished by letters A, B, C, etc. And, further, it shall be incumbent upon the said owner or owners to erect upon the place of outspan, as above determined, in conspicuous situation facing the road, a post, at least nine feet in height, with a board at the top containing an inscription in letters at least one inch in length and clearly legible at ten yards' distance, setting forth as follows:—"Public Outspan, acres, beacons A, B, C, etc." And, further, it shall at all times be incumbent upon the said owner of such farm or piece of land (or, in the event of the same being held in sub-divisions, upon the owners of sub-divisions thereof adjoining the outspan place) to maintain such post and plate and beacons in thorough repair, and inscriptions thereon in a legible condition, failing which the said owner or owners shall not have any claim in respect of any trespass committed on any grass land by any cattle* belonging to any person outspanning on such farm or piece of land.

6.—*Subject to foregoing conditions any Farm may be freed from General Servitude of Outspan.*—It shall be lawful for the owner or occupier of any farm or piece of land as aforesaid, upon the fulfilment of the conditions in the preceding section of this Law, and during the continuance of the fulfilment thereof, but not otherwise, to prevent any person or persons from outspanning on any other portion of his farm or piece of land which, subject to the provisions of this Law, will be freed from the servitude with regard to right of outspan contained in the title deed thereof.

7.—*Special Provision re Victoria, Durban, and Alexandra Counties.*—In the event of its being represented to, and considered by, the Lieutenant-Governor, that in the Counties of Victoria, Durban, and Alexandra, the proportion of five acres per centum, for outspan purpose, is excessive, the Lieutenant-Governor may, with the advice of the Executive Council, determine some lesser proportion for that purpose, with respect to any such County: Provided, however, that a number of landowners, not less than twenty-five, resident in such County, shall have

*See definition of "Cattle" in Sec. 19 of this Law.

memorialised the Lieutenant-Governor to that effect; and the Lieutenant-Governor may, if he shall think fit, in any case before deciding upon any such memorial, direct that enquiry be made upon the subject thereof.

8.—*Outspans on Farms that have been Sub-divided and Transferred.*—In every case where a farm or piece of land shall be, or shall have been, sub-divided and transferred, without fixing or determining an outspan place on the same, as provided by this Law, and where the owners of the several sub-divisions shall agree to set apart one or more particular portion or portions of such farm for an outspan place or places, and shall apply to the Lieutenant-Governor for that purpose, it shall be lawful for the Lieutenant-Governor to cause a portion or portions of such farm, in the proportion as set forth in Clauses 2, 7, and 9, as the case may be, to be selected for outspan, including, if practicable, portions of two or more of such divided pieces of land, subject in every respect to the provisions of the preceding clauses of this Law.

9.—[In certain cases the Governor may authorise a diminution of the area required for outspan places.]

10.—[Repealed by Law No. 14, 1872.]

11.—*Effect of the General Servitude of Outspan where Outspan Place is not Established and Maintained.*—It shall not be competent or lawful for any person, the owner or occupier of any farm or piece of land subject to right of outspan, to prevent any person or persons from outspanning on or near the public road on any part of such farm or piece of land, not being within three hundred yards of any homestead, and making use of any uncultivated portion thereof for the purpose of grazing, until a place of outspan is set apart and definitively maintained in the manner provided in this Law.

12.—*Irregular Notice Boards.*—Any person, the owner or occupier of any farm or piece of land subject to right of outspan, who shall erect any post or board with the view to define or determine a place of outspan on such farm or piece of land as aforesaid, except on the lands as provided in this Law, and any person putting up a post or board with a view to prohibit persons from outspanning on land liable to such servitude shall be liable, on conviction, to a fine not exceeding £5, or, in default of payment, to imprisonment for any period not exceeding one month; and any person or persons who shall remove or damage any post, plate, or beacons lawfully erected as provided in this Law, shall, on conviction before any Resident Magistrate, be adjudged to pay a fine not exceeding £10, or, in default of payment, shall be imprisoned, with or without hard labour, for a period not exceeding two months.

13.—*Government Parties and Outspan.*—Government parties, when employed in the construction or repair of public roads running through

any private lands, shall have the right to outspan on any to them convenient spot on or near the road, not being within three hundred yards of any dwelling house, and to graze their cattle on all adjoining grass lands if unenclosed.*

14.—*Outspan places "public land" under Grass Burning Law.*—Every outspan place set apart under the provisions of this Law shall, for the purpose of the second and sixth sections of Law No. 21, 1865, entitled Law "To prevent the indiscriminate burning of grass," be considered as public land; and the owner or owners of the farm or piece of land on which such outspan place was established shall, in the event of his or their wilfully or negligently burning grass on such outspan place, be amenable to the provisions of the said Second and Sixth Sections of the Law of 21, 1865, aforesaid.

15.—*Width of Public Roads if not Fenced.*—All the public roads shall be deemed, and are hereby declared, to be 100 feet wide; and, if unfenced, loose cattle and horses being driven along any public road may travel on either side of such road to a distance of at least 100 feet without being liable for trespass or for injury done to crops within that distance; provided the provisions of this clause shall not apply to any road which has been laid out upon the authority of the Surveyor-General or Civil Engineer for the Colony, if of a less width than 100 feet along that portion of the land which shall have been fenced previous to the passing of this Law.

16.—*Crown Lands subject to Servitude of Outspan.*—All lands in the possession of the Crown in this Colony shall be, and the same are, hereby declared to be subject to the servitude of outspan, upon such regulations and conditions as the Lieutenant-Governor, with the advice of the Executive Council, may with respect to the servitude of outspan generally from time to time establish and proclaim in the *Government Gazette*.

17.—*Reservation, in certain cases, of Servitude of Outspan in respect of Alienated Crown Lands.*—In all future disposals of Crown lands by sale, rental, grant, or otherwise, being not less in extent than five hundred acres, the servitude of outspan shall be reserved in the instrument of conveyance or demise.

18.—*Native Reserves.*—All lands set apart or granted as Native Reserves or Locations shall be and the same are hereby declared to be liable to the servitude of outspan, anything in the title deeds thereof to the contrary notwithstanding: Provided always that the right of outspan upon such Native Reserves or Locations shall be regulated, controlled, and governed by such rules as the Lieutenant-Governor, with the advice

* See also Sec. 18 of Law No. 19, 1875, in regard to the erection of temporary dwellings for road parties.

of his Executive Council, may from time to time frame and establish, in accordance with the provisions of this Law, for the regulation of the general servitude of outspan.

19.—*Definition of Terms.*—The term *outspan* shall be understood to include the grazing and watering for a period not exceeding twenty-four hours, except in case of accident or other unavoidable circumstance, of all animals used or driven by persons when travelling, and the term *cattle* shall include all animals so used or driven.

[Dated 14th Sept., 1870.]

ACT No. 15, 1896.

"To provide for the Acquisition of Lands for Outspan Places."

1.—*Power to take Lands for an Annual Rent.*—The Government of this Colony, by the Minister of Lands and Works for the time being, may enter upon and take for an annual rent charge such lands as may be required throughout the Colony for outspan purposes, and for such time as may be necessary.

2.—*Exemption.*—No land shall be so taken under this Act from any farm or piece of land upon which a public outspan has been already established.

3.—*Reversion of Land.*—Any land taken under this Act shall revert to the owner freed from the operation of this Act, in case he shall lay off an outspan in terms of Laws No. 9 of 1870, and No. 14 of 1872.

4.—*Expenses.*—Such annual rents and the expenses of survey and all other expenses incurred in carrying out the provisions of this Act shall be paid out of the public revenue of the Colony.

5.—*Incorporation of Lands Clauses Law.*—The "Lands Clauses Consolidation Law, 1872," is, except as varied by this Act, incorporated with this Act and the taking of land for an outspan place under the provisions of this Act shall be deemed to be an undertaking within the meaning of the said Law.

6.—*Settlement of Disputes.*—All questions and disputes as to any rent charge under this Act shall be settled in like manner as questions and disputes relating to purchase money or compensation under the "Lands Clauses Consolidation Law, 1872."

7.—*Fencing of Land Taken.*—Any land taken for an outspan place under this Act may be fenced by and at the expense of the Government.

8.—*Outspan Laws and Outspans, how far Affected.*—Nothing in this Act contained shall interfere with the provisions of Laws No. 9, 1870, and

No. 14, 1872, or with any outspan places established thereunder, except that the taking and user of lands under this Act shall for the time being exempt the remainder of the farm from the servitude of the outspan.

[Dated 12th June, 1896.]

REFERENCES IN OTHER LAWS.

As regards the offence of taking any animal infected with glanders on public roads, outspans, etc., see Section 8 of Act No. 27, 1898 (Ch. I., vi.).

Section 44 of Law No. 30, 1887, provides that "no person shall be allowed to erect any fence over any public or main road: Provided, however, that nothing herein contained shall prevent any owner or occupier from availing himself of the powers of fencing in manner and form as provided for in Clause 17 of Law No. 17, 1883*" (Ch. VII., i.).

*Repealed by Law 36, 1888 (which in its turn was repealed by Act 35, 1901.

Chapter VII.

FENCING, TRESPASS, AND SQUATTING.

[LAWS. — *Fencing* : Law 30, 1887 ; Law 26, 1890 ; Act 52, 1906. *Trespass* : Law 13, 1874 ; Act 6, 1897. *Squatting* : Ordinance 2, 1855 ; Law 41, 1884]

The principal Law dealing with fencing is Law No. 30 of 1887. This Law provides for the erection of dividing fences between adjoining lands, and prescribes the apportionment of cost; it further deals with the maintenance of repairs and with the question of compensation in case of damage done to such fences from various causes. Sections will also be found dealing with the erection of fences by occupiers whose lands abut on Crown Lands or public roads. The matter of fencing of public roads by occupiers of land is further dealt with under Law No. 26 of 1890, which provides for the contribution by Government of one-half the cost of such fences.

Act No. 52 of 1906 empowers the Governor in Council to extend the provisions of these Laws to the Northern Districts and to Zululand.

The matter of trespass is dealt with by Law No. 13 of 1874 and Act No. 6 of 1897. Wilful trespass is defined—and it should be noted that the latter of the two Laws named deems a fence to be sufficient warning to trespassers, so that, as long as there is a fence, a notice board is not actually necessary. Produce found on a trespasser may be seized and retained until such time as the trespasser can prove to the satisfaction of a Magistrate that such produce is his own lawful property, failing which proof he shall be deemed to have stolen the same. Trespassing dogs, not being in charge of some competent person, or not bearing a collar with the name and address of the owner, may be immediately destroyed; and if the dog is found worrying sheep or other animals or pursuing game, such collar is not deemed sufficient to protect the dog from being destroyed. Punishment is provided by Section 5 of the principal Law for damaging notice boards forbidding trespassing.

Unlicensed squatting by Natives is dealt with by Ordinance No. 2 of 1885, and squatting on Crown Lands is specially provided for by Law of 1855, and squatting on Crown Lands is specially provided for by Law Natives can be removed upon an order from the Magistrate.

I.—FENCING LAWS.

LAW No. 30, 1887.

"To regulate the Erection and Maintenance of Dividing Fences."

Short Title.—"The Fencing Law, 1887."

[SECTIONS 2, 3, 4, 5 and 6 were repealed by Act No. 52, 1906.]

7.—*Definition of Terms.*—In this Law, if not inconsistent with the context, "*To repair*" includes to trim, keep, and maintain any fence or ditch, or part thereof; "*Alienate*" and "*Alienation*," respectively, include a limited disposal by lease or license, as well as an absolute disposal by sale or otherwise; "*Owner*" includes a registered proprietor, or a lessee for any term, or a trustee holding a property in trust; "*Occupier*" includes any person who is in the actual occupation of or entitled as owner to occupy any land alienated from the Crown, and all persons being selectors of land on deferred payments; "*Dividing Fence*" means a fence separating the lands of different occupiers; "*Crown Lands*" includes all lands of whatever description not alienated by the Crown under grant, lease, or by conditional purchase; "*Native Location*" means all lands conveyed to or vested in any Corporation or person or persons in public trust for Natives; "*Notice*" means a notice in writing or in print, or partly in writing and partly in print, and may be served upon any person either personally or by leaving the same with some adult inmate at his usual residence or place of business, or if such person or occupier shall be absent from the Colony, then by delivering the same to or leaving the same at the residence of his known agent in the same manner. If there shall be no such agent resident in the Colony, or if such first-mentioned person is not known or cannot be found, or any land is unoccupied, then it shall be sufficient to insert such notice at least three times during three months in some newspaper circulating in the district.

8.—*Definition of "Sufficient Fence."*—It shall be lawful for any owner or occupier of land to erect a fence of any of the kinds mentioned and described in Schedule A of this Law, and any such fence shall be deemed a sufficient fence within the meaning of this Law.

10.—*Construction of Dividing Fences.*—The occupiers of adjoining lands not divided by a sufficient fence shall be liable to join in or contribute to the construction of a dividing fence between such lands in equal proportions, and notwithstanding that such dividing fence shall not extend along the whole boundary line; but no occupier shall be liable to contribute to any fence which is not, as far as practicable, continuous throughout its length.

11.—*Compelling Contributions.*—Any person desiring to compel any other person to contribute to the construction of a dividing fence under the provisions of this Law may serve on such person a notice to fence, which shall be in the form laid down in Schedule B hereto annexed, and shall specify the boundary to be fenced, and shall contain a proposal for fencing the same, and shall specify the kind of fence proposed to be constructed. If any person shall erect any fence without giving notice as aforesaid, the occupier or the owner, as the case may be, of such adjoining land shall not be liable to pay any portion of the value of such fence.

12.—*Objections to Proposed Fence.*—If any person upon whom a notice to fence is served shall object to the kind of fence specified in such notice, and shall desire to erect a sufficient fence of a different kind, he may, if resident in the Colony, within 28 days, and if absent from the Colony, within three months, of receiving such notice, signify such objection and desire in writing to the giver thereof; and thereupon (unless the parties can agree upon the kind of fence which shall be erected) the question of the description of fence which shall be erected and the cost thereof shall be determined by a Resident Magistrate in the manner provided by Section Thirty-four of this Law.

13.—*Occupiers serving each other with Notices to erect different kinds of Fences.*—If the occupiers of adjoining lands shall have served each other with notices to fence, and in such notices the descriptions of the kind of fence which the respective givers thereof desire to be erected shall vary, then (unless the parties can agree upon the kind of fence to be erected) the question of the kind of fence which shall be erected and the cost thereof shall be determined by a Resident Magistrate in the manner provided by the Thirty-fourth Section of this Law.

14.—*Interval after which Fencing may be proceeded with.*—If within four months when the land to be fenced is open land, and within six months when the land is covered with standing bush, after the service of a notice to fence, the giver and receiver thereof do not enter into an agreement as to the nature of the fence to be made and the cost thereof, and the mode and time of making the same, and if the receiver thereof shall not serve on the giver thereof an objection in manner provided by Section 7 of this Law to the kind of fence specified, then the person giving notice to fence may proceed to erect a fence sufficient within the meaning of this Law.

15.—If either party shall neglect or fail for the space of four months to perform his part of any such agreement which may be so made, the other party may thereupon, or at any time within six months thereafter, make a fence of the kind or description so agreed upon, and may

immediately thereupon, or at any time thereafter, recover from the defaulting party one-half of the actual costs of making such fence.

16.—*Apportioning Cost of Dividing Fences.*—The occupier of the adjoining land to whom a notice to fence shall have been given, or when such half cost has not been previously paid, any person who during the continuance of a dividing fence shall go into occupation of such adjoining land, shall be liable for and shall pay to the person who constructed the fence, or his assigns, one-half of the original value of such dividing fence within one month after a demand made upon him for the purpose by due notice.

17.—*Provisions in event of Disagreement.*—If any person shall desire to put up a dividing fence of a description different from any fence mentioned in Schedule A, he shall give the required notice as hereinbefore provided to the parties whom he wishes to join in the making of such fence; and if the said parties shall not within two months of the delivery of the aforesaid notice object in writing to the erection of such fence, then such person first mentioned may proceed to erect such fence accordingly, and such fence shall be deemed to be a sufficient fence under this Law. Such person shall be entitled to recover from the occupiers of the adjoining lands a contribution towards the cost of erecting such fence, not exceeding in amount the maximum price allowed by this Law as the half cost of erecting a sufficient fence hereunder.

18.—*Maximum Price of Half Cost in absence of Agreement.*—The maximum price to be paid in respect of one-half of the actual cost of erecting any sufficient fence shall not exceed six shillings per chain, except in cases of special agreement, exclusive of any extra cost for clearing bush along the line of such fence: Provided always, that no greater sum shall be charged for the erection of any fence than the absolute half of the cost of such fence.*

19.—*Clearing Bush.*—Where any fence is required to be erected on land covered with standing bush, and the required notices as hereinbefore provided have been given, the person erecting such fence shall be entitled to clear the bush for a width not exceeding six feet on each side along the entire length of such fence, and may fell any tree standing in the immediate line of any such fence; and the cost of such clearing shall be added to the cost of the erection of such fence and be apportioned accordingly.

20.—*Incidence of Rivers, etc.*—When a river, creek, natural watercourse, or rocky or impracticable land forms the boundary of contiguous lands, the occupiers of such contiguous lands may agree upon a line of fence on either side of such river, creek, or natural watercourse, and in the event of their not making any such agreement, either party may

*As amended by Law 36, 1887.

apply to the Resident Magistrate of the district, who may appoint one or more persons to inspect the proposed line of fencing, and who shall determine whether any fence is necessary, and decide the line of fence to be erected, and whether any and what compensation in the shape of annual payment shall be paid to either of the parties occupying such contiguous lands in consideration of loss of occupation of land. The occupation of lands on either side of such line of fence shall not be deemed adverse possession, and shall not affect the title to or possession of any such lands save for the purposes of this Law.

21.—*Ditch-and-Bank Fences.*—The occupier of any land may, in making a ditch-and-bank fence dividing his land from the land thereto adjoining, make a ditch in such adjoining land (Crown Lands inclusive) and use the soil taken therefrom towards the making of a bank, or he may make the ditch on his own land, and place the bank on such adjoining land; but no ditch or bank shall be made upon any such adjoining land in any case where a hedge of roses, Mauritius thorn, or other live hedge may have been planted and kept in good thriving condition thereon, so as to disturb or injure such hedge, without the consent of the occupier of such land first obtained. Where a dividing fence is made of posts and rails, or wire, or of stone, the posts or stones of such fence shall, as near as may be, be placed on the boundary line.

22.—*Fences along Roads.*—If the occupier of any land bounded by a road shall have erected a fence on the common boundary of his land and such road, and any other person shall adopt any means by which such fence shall be rendered of beneficial use to himself, and shall avail himself of such fence, such person shall be liable to pay to the person who erected such fence, or to the occupier of the land whereon such fence is erected, interest on half the then value of such fence at the rate of five per centum per annum for so long as he shall continue to avail himself of such fence, and shall also, as long as aforesaid, be further liable for half the cost of the repairs of such fence.

23.—*Roses or Mauritius Thorn not to be Planted along Dividing Fences except by mutual consent of Owners.*—No person shall plant any roses, or any Mauritius thorn, upon or alongside any boundary line or dividing fence without the consent of the occupiers of the adjoining lands; and every person who shall contravene this section shall be liable, for every such offence, to a penalty not exceeding Twenty Pounds, and the occupier of the adjoining land as aforesaid shall be entitled to take up and destroy such roses or Mauritius thorn, and to recover in any Court of competent jurisdiction the cost of such work from the person who shall have so contravened the provisions of this section.

24.—*Provision for Live Fences.*—If the occupier of any land bounded by a road desire to plant a live fence on the common boundary of his

land and such road, and for that purpose to construct a fence upon such road until such live fence shall have grown up, he may at any time, with the consent of the Government, on conditions to be prescribed by it, proceed to construct a fence on such road so that no part of such fence be more than five feet distant from the nearest point on the boundary of his land; and if such occupier forthwith after the construction of such fence proceed to plant a live fence on the boundary of his land and such road, constantly with all proper diligence keeping, maintaining, and protecting from injury such live fence, he may maintain on such road the fence so constructed for such time not exceeding six years, or such longer time as the Government may in writing allow, until such live fence becomes a sufficient fence within the meaning of this Law.

25.—*Repairs of Dividing Fences.*—When any dividing fence or part thereof made or to be made shall be out of repair or become insufficient, the occupiers of land on either side thereof shall be liable to the cost of repairing such fence in equal proportions.

26.—The occupier of any land separated from any adjoining land by a dividing fence may serve a notice upon the occupier of such adjoining land requiring him to assist in repairing such fence or part thereof, and if such occupier shall refuse or neglect for the space of one week after the service of such notice to assist in repairing such fence, such first-mentioned occupier may repair such fence, and demand and recover of and from such other occupier half the cost of repairing the same.

27.—*Accidents to Dividing Fences.*—If any dividing fence or any portion thereof is destroyed by accident, the occupier of land on either side may immediately repair the same without any notice, and shall be entitled to recover half the expenses of so doing from the occupier of the adjoining land.

28. In case any dividing fence is destroyed by fire, or by the falling of any tree or trees, or damaged by any cattle, the occupier through whose neglect (if any) such fire shall have originated or have caused injury to the fence, or such tree or trees shall have fallen, or by whose stock such fence shall have been damaged, shall be the party bound to repair the entire of the fence so damaged as aforesaid.

29. Nothing herein contained shall be deemed to take away or interfere with the right of any person to sue for and recover compensation for or in respect of any damage or injury to any fence occasioned by the reckless or negligent use of fire.

30.—*Interest on Half Cost of Fencing.*—In any case where a person shall elect or be liable to pay interest on the half cost of a dividing fence the person entitled to such interest shall have the same remedy for the recovery thereof as he would have for the recovery of the half-cost of such fence.

31.—*Fences along Crown Lands.*—The owner of land who shall have made, or who shall hereafter make, a fence dividing such land from adjoining unalienated land of the Crown, may demand and recover from the owner or occupier of such Crown Land when alienated, within a period of six months after such alienation, half the then value of the said dividing fence.

35.—*Special Agreements Relative to Fencing.*—Nothing in this Law contained shall be deemed or taken to affect any covenant, contract, or agreement made or hereafter to be made relative to fencing between landlord and tenant, or between occupiers of adjoining land, or between any other persons whomsoever.

36.—*Entry upon Land for Fencing Purposes.*—Any person constructing or repairing a fence under this Law, his agents and servants may, if there be no available access thereto over their own land, with or without horses, cattle, wagons, carts, or carriages, at all reasonable times during such construction or repairing, enter upon any portion of the contiguous land and do thereon such acts, matters, and things as are necessary or reasonably required to carry into effect the construction or repairing of such fence: Provided always that nothing herein contained shall authorise the entry, for the purpose aforesaid, upon any land in crop or upon any garden, orchard, plantation, shrubbery, or pleasure ground without the consent of the owner thereof, or shall authorise any person to cut down, lop or injure any fruit exotic, or other tree or shrub without the special sanction of the aforesaid owner, save as is otherwise provided for in this Law.

37. Every owner or occupier of any land who shall incur or suffer any loss or damage by any act or thing done by any person wilfully acting contrary to the provision of the last foregoing section shall be entitled to compensation for the same.

39.—*Monies due under this Law First Charge on Land.*—All moneys due to any person for erecting a dividing fence under the provisions of this Law shall be, and are hereby declared to be, a first charge on the land in respect of which the same shall be payable, and all such moneys shall be a first charge and shall take priority of all charges and incumbrances whatsoever and whensoever made upon and over the immoveable property in respect of which such moneys are payable.

40.—*Intervention in Suits.*—Any person may come in and defend any proceeding under this Law against any tenant of such person in consequence of which such person may ultimately incur any liability, and any defence which the person originally proceeded against might set up shall be available to the person so coming in to defend.

41.—*Lands to which Law does not apply.*—This Law shall not apply to any unalienated Crown Lands, nor shall the Crown, the Governor,

nor the administration, management, or control of the Crown Lands be liable under the authority of this Law to make any contribution towards the construction or repairing of any dividing fence between the land of any occupier and any Crown Lands. Municipal Corporations shall not be liable to contribute to the cost of any dividing fence which may be erected within the boundaries of the Corporation lands.*

42.—*Selectors of Land on Deferred Payments.*—The provisions of this Law shall apply to all persons being selector of land on deferred payments, as if such persons held the land so selected under grants, and the said persons shall be liable in respect of the fencing of such land in the same manner as owners of lands under grants from the Crown.

43.—*Payment by Instalments.*—If any person shall be called upon under this Law to join in or contribute to the construction of any dividing fence, and such person shall be unable, sooner or otherwise, to pay the amount or any part thereof, which he shall be or become liable to pay, and shall, within one month after the amount which he is liable to pay shall be fixed, give notice to the person calling upon him to join or contribute as aforesaid, that he desires to pay such amount by instalments as hereafter mentioned, the amount payable by such person, or such part thereof as he shall not be willing to pay sooner or otherwise as aforesaid, together with the interest thereon, at the rate of eight per centum per annum, shall be paid by such person by equal yearly instalments, such instalments to be so calculated and fixed that the said capital sum and interest shall be paid off in a period of fifteen years from the date when he shall have given such notice as aforesaid, as more particularly shown in Schedule C hereto: Provided that, notwithstanding such notice, and the payment of any instalment as aforesaid, it shall be lawful for such person at any time during the said fifteen years, to pay the value at that time of the unpaid instalments in one sum, as shown in Schedule D.**

44.—*Public Roads.*—No person shall be allowed to erect any fence over any public or main road: Provided, however, that nothing herein contained shall prevent any owner or occupier from availing himself of the powers of fencing in manner and form as provided for in Clause 17 of Law No. 17, 1883.

45.—*Outspan.*—Nothing in this Law contained shall in any way interfere with, abrogate, or diminish the servitude of outspan imposed by Law or reservation or otherwise upon grants of lands in Natal.

*Section as amended by Law 23, 1889.

**Section as amended by Act 29, 1894; Act 12, 1897, enacts:—"For all purposes relating to boundary fences dividing Native Locations from the adjoining lands, the Fencing Law No. 30 of 1887 shall extend to the whole Colony, notwithstanding anything to the contrary contained in Section 41 of that Law."

46.—*Persons not included in term "Occupier."*—The word *occupier* shall not include tenants occupying under a grazing or agricultural lease directly from the Crown, nor tenants holding from year to year, nor Native tenants.

47.—*Apportionment of Cost of Fencing as between Landlord and Tenant.*—In every case where the occupier is tenant under a written lease the owner shall be primarily liable for a moiety of the cost of the construction of a fence under the provisions and in terms of this Law, and the tenant shall be liable during every year he may occupy his farm under the said lease to pay the said owner a fourth part of the annual instalment payable in respect of the construction of any such fence.

[Dated 14th March, 1887.]

DESCRIPTION OF "SUFFICIENT FENCE."

(Being Schedule A referred to in the foregoing Law.)

1. A substantial wire fence, having not less than six wires tightly stretched, with posts of durable wood or iron, well and substantially erected, the posts or standards to be not more than ten feet apart, top wire not to be less than three feet nine inches from the surface of the ground; and the wires not to be lighter than No. 8 in iron or No. 10 in steel. The space between each of the two bottom wires, or the bottom wire and the ground, not to exceed six inches.

2. A substantial wire fence, having not less than six wires, tightly stretched, with posts of durable wood or iron, well and substantially erected, the posts or standards not to be more than sixty feet apart, top wire not to be less than three feet nine inches from the ground, with two or more barbed wires and four plain wires, not to be lighter than No. 10 in steel or No. 8 in iron, and with lacing of wire (not lighter than No. 12), such lacings not to be more than six feet apart.

3. A stone wall not less than three feet six inches in height, exclusive of the coping, and not less than two feet six inches in width at base.

4. A bank or wall of substantial materials, at the least four feet six inches in height, of which the slope is not more than one foot from the perpendicular.

5. A close and sufficient live fence, at least four feet in height, proof against cattle, such fence to be kept properly trimmed.

6. A combination of the above kind of fences, at least four feet in height.

7. Any other description of fence mutually agreed upon by the persons interested.

8. A fence made in any other way equal in efficiency to any of the above-mentioned fences.

*Schedule B.***Notice to make Fence.*

To _____, occupier [or owner, or lessee, or
agent, as the case may be] of _____ [describing
adjoining land].

Take notice, that I desire that a boundary or dividing fence between [describing
the lands] be made immediately (on or before the _____ day of _____, 18____, and
that such fence shall be a [describe the fence].

Dated the _____ day of _____, 18____.

A.B.,
Occupier [or owner, or lessee, or agent] of, &c.

*Schedule C.***

*Table of Equal Instalments payable at the end of each year for Fifteen Years,
corresponding to amounts payable under Section 3 of this Law :—*

Amounts payable.	Equal instalments payable at the end of each year for 15 years.	Amounts payable.	Equal instalments payable at the end of each year for 15 years.
£	£ s. d.	£	£ s. d.
1.	0 2 4	80	9 6 11
2	0 4 8	90	10 10 3
3	0 7 0	100	11 13 8
4	0 9 4	200	23 7 4
5	0 11 8	300	35 1 0
6	0 14 0	400	46 14 8
7	0 16 4	500	58 8 4
8	0 18 8	600	70 2 0
9	1 1 0	700	81 15 8
10	1 3 4	800	93 9 4
20	2 6 9	900	105 3 0
30	3 10 1	1,000	116 16 8
40	4 13 6	2,000	233 13 4
50	5 16 10	3,000	350 10 0
60	7 0 2	4,000	467 6 8
70	8 3 7	5,000	581 3 4

NOTE.—Yearly instalments for any sum not mentioned in these columns, such as £2,345 may be obtained as follows :—

	£ s. d.
£2,000 gives	233 13 4
300 „	35 1 0
40 „	4 13 6
5 „	11 8
Therefore £2,345 gives	£273 19 6

* Referred to in Sec. 11 of the foregoing Law.

** Referred to in Sec. 43 of the foregoing Law. This Schedule stands as amended by Law No. 23, 1889.

*Schedule D.**

Aggregate value of Unpaid Instalments, each £100 in amount, of which the first is payable at once; and subsequently at yearly intervals:—

Number of Instalments of £100 each.	Aggregate Value.	Number of Instalments of £100 each.	Aggregate Value.
	£ s. d.		£ s. d.
1	100 0 0	9	674 13 3
2	192 11 10	10	724 13 9
3	278 6 6	11	771 0 2
4	357 14 2	12	813 17 11
5	431 4 3	13	853 12 2
6	499 5 5	14	890 17 6
7	562 5 9	15	924 8 5
8	620 12 9		

LAW No. 26, 1890.

“To amend Law No. 30, 1887, entitled ‘Law to regulate the Erection and Maintenance of Dividing Fences.’”

1.—*Annual Charge upon the Public Revenues for Fencing Purposes.*

—A sum not to exceed Two Thousand and Five Hundred Pounds Sterling shall, in each and every financial year, be chargeable upon and payable out of the public revenues of the Colony for fencing purposes, and the Governor in Council may entertain any application from the owner of land who, with the consent of the Colonial Engineer of the Colony of Natal, has fenced on both sides thereof any public or main road passing through his land, for a contribution out of such fund not exceeding one-half of the total cost as determined and ascertained by “The Fencing Law, 1887,” and the several Laws amending the same, towards the expense of erecting such fencing.

2.—*Allocation of Annual Sums.*—The said sum of Two Thousand and Five Hundred Pounds Sterling shall be allocated in equal shares among the several Counties and Divisions in which the Law 30, 1887, and the Laws amending the same, are in force.

3.—*Applicant to show Damage to be caused by Roads, etc.*—The applicant in each County or Division, being the owner of land, who applies for a contribution from the public revenue towards the expense of erecting fencing on both sides of any public or main road passing through his land, must show to the satisfaction of the Governor in Council that the said road and its use are a source of damage to and depreciate the value of the property of such owner, and that the fencing towards the construction of which the contribution is asked was constructed during the financial year in which the application is made, and to the satisfaction of the Colonial Engineer.

*Referred to in Sec. 43 of the foregoing Law. This Schedule stands as amended by Law No. 23, 1889.

5.—*Limitation of Application of Law.*—Nothing in this Law contained shall apply to any fence erected on the sides of any main or public road, within the boundaries of any Municipal Corporation, or of any Local Township, constituted under the provisions of Law No. 11 of 1881, and the Laws amending the same.

6.—*Construction.*—This Law, and the Laws No. 30, 1887, No. 36, 1887, and No. 23, 1889, shall be read and construed together as one Law.

[Dated 31st July, 1890.]

ACT No. 52, 1906.

"To extend the Operation of the Fencing Law, 1887."

1.—*Repeal.*—Sections 2, 3, 4, 5 and 6 of the Fencing Law, 1887, are hereby repealed, and from the date of the commencement of this Act the said Law, with the Laws and Acts amending the same, shall be in operation throughout the whole of the Colony, except the Province of Zululand and those parts which are described in Act No. 1, 1903, as the Northern Districts.*

2.—*Extension of Fencing Laws.*—The Governor in Council may by Proclamation extend the operation of the said Laws and Acts to the Province of Zululand and the Northern Districts aforesaid, or he may by Proclamation from time to time extend the operation thereof to any specified part or parts of the Northern Districts.

3.—*Joint Construction.*—This Act shall be read in conjunction with the Fencing Law, 1887.

II.—TRESPASS.

LAW No. 13, 1874.

"With regard to Trespass on Private Lands."

1.—*Wilful Trespass Defined.*—If any person shall wilfully trespass on any farm, estate, land, garden, yard, or premises belonging to another person, or to any Corporation or company, public or private, on which, or near to which, there shall be placed in a conspicuous position notice

*The Districts of Vryheid and Utrecht, and a portion of the District of Wakkerstroom lying south of a line drawn from the north-eastern corner of Natal, East of Volksrust, to the head waters of the Pongolo River, and thence along that river to the border of the Utrecht District." (Sec. 3 of the Act cited).

in large legible letters forbidding in general terms all persons to trespass, and warning them against the consequences of so doing*; or, if in the absence of such notice any persons shall wilfully trespass, or refuse to quit after being requested by the owner, occupier, tenant, or their agents or servants, or in the absence of such notice, any person who has received due special notice, written or verbal, shall wilfully trespass as aforesaid, every person so trespassing, and all others aiding and assisting, shall be deemed wilful trespassers, and may be seized and detained by such owners, etc., etc., as aforesaid, or anyone they may call to their assistance, until such trespassers can be conveniently taken before the Resident Magistrate, and when convicted such trespassers shall forfeit any sum not exceeding £5, or, in default, imprisonment not exceeding three months: Provided that every labourer or person having or occupying any building or portion thereof, on any farm or estate having an open path or road, authorised by the owner or other lawful authority, leading from the public road to such premises, and his relations, family, and visitors, shall not be considered trespassers by passing upon or along such authorised road.

2.—*Produce found on a Trespasser may be Seized and Detained.*—If any trespasser at the time of trespassing shall be in possession of any wood, timber, fruit, vegetable, or animal product, similar to any growing or being upon the estate, it shall be lawful for the owner, tenant, occupier, etc., to seize and detain such produce until such trespasser shall prove to the Resident Magistrate that the same has not been taken from such estate.

3.—*Any Trespasser shall be deemed Guilty of Theft.*—If such trespasser shall not within reasonable time, to be assigned by the Resident Magistrate, make it appear by what lawful means he came in possession of such property, he shall be deemed to have stolen the same.

4.—*Dogs Trespassing and Uncontrolled and without Collar may be Destroyed.*—If any dog shall be found trespassing on any farm, estate, land, garden, yard, or premises belonging to any person, Corporation, or company, and at large, without being under the immediate control, protection, or custody of some competent person, or unless such dog shall have a collar round its neck with the name of its owner legibly engraved or painted in English letters, any such dog whilst so found trespassing and at large may be immediately killed, or destroyed by the owner or occupier of the farm, etc., or by any agent or servant of his:

Provided that such collar shall not protect a dog from liability to be destroyed if found worrying sheep or other animals, or pursuing game.

*See Act No. 6, 1897, at the end of this Law.

or if trespassing upon a farm and not being then in the immediate custody, protection, or control of some competent person.*

5.—*Punishment for Defacing or Destroying any Board or Notice Forbidding Trespassing.*—Any person pulling down, destroying, or obliterating any board or notice put up by Law forbidding trespass, shall, for each offence, forfeit a sum of not less than £1, and may be condemned to pay for the restoration of such board or notice.

6.—*Police bound to Assist in Arresting Trespassers.*—Every member of the Police Force and every constable shall assist in the arrest of any trespasser, whenever called upon by the owner or occupier of any farm, estate, land, garden, or yard on which such trespass shall take place.

7.—*Power of Summary Conviction.*—All complaints under this Law shall be heard and determined in a summary manner.

8.—[Repealed by Act No. 49, 1898.]

9.—*Saving of Right of Action for Damages.*—Nothing herein contained shall prevent any person from proceeding by way of civil action to recover damages in respect of any trespass on his land or property.

ACT No. 6, 1897.

“To amend the Law with regard to Trespass.”

1.—*Fence a Notice against Trespass.*—A fence shall be deemed to be constructive notice against trespass for the purpose of Section 1 of Law 13, 1874, and to be sufficient warning to trespassers.

III.—SQUATTING.

ORDINANCE No. 2, 1855.

“Ordinance to Prevent Unlicensed Squatting, and to Regulate the Occupation of Land by the Natives.”

(Amended by Law 41 of 1884, “The Squatters’ Rent Law.”)

2.—*Penalty for Unlicensed Squatting.*—Any native who shall without license or permission hereafter erect any hut, or building of any kind, or shall make any garden on any Crown Land, not being within a Native Location, or on any land belonging to any private person, shall in respect of every such hut, building, or garden, forfeit and pay a sum not exceeding One Pound, or be imprisoned with hard labour for the term of three months.

* This proviso, as well as the words “legibly engraved or painted in English letters,” after the words “with the name of its owner,” in the first paragraph, were added by Act No. 25, 1899.

3.—*Ejection of Natives Unlawfully Residing on Private Property.*—If the owner of any land, or his representative, shall complain to the Magistrate of his district that any Native is unlawfully residing on the same, then in case the said Native had originally received no permission to reside on such land, the Magistrate shall cause him to be instantly removed therefrom; and in case the said Native resided on the land, other than a lease or other agreement, which has expired or become void, through any act or omission of the said Native, the Magistrate shall, after giving the said Native time to collect and gather in the crops then growing on the land, cause him to be removed therefrom.*

4.—*Action of Ejectment Unnecessary.*—Under authority of this Ordinance the Magistrate may cause offending Natives to be summarily removed, and to cause their huts, or other buildings, to be pulled down.

5.—[Natives not to reside on unoccupied land without permission from the Governor, Colonial Secretary, Secretary for Native Affairs, or Resident Magistrate.]

6.—*Owners, etc., of Land to send in a Return to Resident Magistrate of Kafirs; where more than three Families Reside.*—No owner or occupier of land shall allow more than three Native families to reside on his land, unless he sends in a return, in the month of January each year, of the number of Natives and huts, and also of his agreement with such Natives. Any person omitting to send in such return is liable to a fine for every such omission, viz., not less than £1, nor more than £5, and is responsible for the damage or trespass committed by such Natives or their cattle on adjoining lands.

LAW NO. 41, 1884.

"To Provide for the Collection of Rent from Native Squatters or Occupiers of Crown Lands."

3.—*Squatting on Crown Lands Prohibited.*—[No person allowed to come on to and squat on Crown lands without the permission of the Governor, under a penalty of £1, or in default imprisonment not exceeding three months.]

4.—*Native Squatters may be Removed on Six Months' Notice.*—Any Native squatter may be removed from any Crown Lands by the Resident Magistrate giving such squatter six months' notice, in writing, in the month of January.

5.—*On Expiration of Notice Squatters may be Summarily Removed.*—In all cases when notice as above has been given, and such notice is

*If the native plants crops after notice to quit, he cannot claim to gather them. (*Sigarmena v. Tar*, 5, N.L.R., 135).

disregarded by the Native squatter, no action for ejectment shall be necessary, and the Magistrate can order the squatter to be summarily removed.

REFERENCES IN OTHER LAWS.

FENCING.

The compulsory erection of fences, as might be required by the Minister of Agriculture, to prevent the spread of East Coast Fever was provided by Act No. 6 of 1907—for the text of which Law see Ch. I. (ii.). Loans to occupiers of land for the purpose of erecting fencing were authorised by Act No. 20 of 1910—see Ch. I. (ii.). Removal of or interference in any way with fences erected in connection with the suppression of East Coast Fever is dealt with in Section 7 of Act No. 54, 1906 (see Ch. I., ii.).

The fencing of public roads is provided for by Act No. 9 of 1902, the text of which will be found in Ch. VI. (iii.).

In providing for the acquisition of land for outspan places, Act No. 15, 1896 (Section 7) permits the fencing of any land taken for an outspan by Government at the public expense. (The text of this Act will be found in Ch. VI., iv.).

TRESPASS.

Under Section 11 of Act No. 30, 1897 (Lungsickness Prevention) an owner allowing cattle from a licensed herd to trespass is liable for all damage caused by such trespass to any herd with which the diseased cattle so trespassing may have come into contact, provided infection occurs within twenty-one days (see full text in Ch. I., iii.). The straying of cattle when East Coast Fever is in the neighbourhood is dealt with in Section 6 of Act No. 54, 1906 (East Coast Fever). The owner of such cattle is liable for any damages they may have brought about, as well as for the expenses incidental to the detention and destruction or quarantining of the cattle (see Ch. I., ii.).

Similarly in the Scab Law of 1887 (Law No. 48, 1887), provision is made for straying or trespassing sheep infected with scab. See the full text of the clause relating to this provision (Section 10) in Ch. I. (viii.).

In describing the method to be adopted in laying out and maintaining an outspan, Section 5 of Law No. 9, 1870, provides that, unless the required notice board and beacons are maintained in thorough repair, the occupier of a farm on which an outspan exists shall not have any claim in respect of trespass committed on any grass-land by draught animals belonging to anyone outspanning there (see Ch. VI., iv.).

Trespass on private or Crown lands for the purpose of destroying game is dealt with in Sections 7 and 8 of Law No. 16, 1891—see text in Ch. II. (v.).

Chapter VIII.

GRASS-BURNING.

[Laws.—Law 21, 1865; Sec. 14 of Law 9, 1870; Law 21, 1874; Act 31, 1895; Act 18, 1902; Act 3, 1905.]

On the subject of grass-burning there has been a fair amount of legislation, but the two principal Laws are Law No. 21 of 1865 and Act No. 31 of 1895.

Neglect of a grass fire resulting in the fire's crossing the boundary of the farm and doing any damage on neighbouring lands is punishable by a fine of £10; whilst a fine of £25 is prescribed for the setting alight of grass on land which is not tenanted or owned by the person starting such fire (Act 31, 1895, Sections 7 and 8). Whilst this fire is prescribed, the Law does not interfere with the right of any person to sue for and recover compensation for any damage occasioned by neglected fires (*Idem*, Section 11). A firebreak has to be made around the boundary of every farm each year between the end of April and the 15th August; and the manner in which this is to be done is described in Sections 9 and 10 of the 1895 Act. The main provisions of these two Laws (Law 21 of 1865 and Act 31 of 1895) are given below, but, as will be seen, the latter is practically a re-enactment of the former, with enlargements.

Under Section 14 of Law 9, 1870, outspans are deemed public lands, and so come under the provisions of the Grass-Burning Laws of 1865 (Section 2) and 1895 (Section 8). The 1895 Act was also extended in 1902 to include railway lands; and by an Act passed in 1905 (No. 3 of that year) the onus of disproving negligence is placed upon the defendant in actions for damages sustained by fire occasioned by a locomotive.

LAW NO. 21, 1865.

"To Prevent the Indiscriminate Burning of Grass."

1.—*Penalty for Burning Grass if Fire extends beyond the Parties' Lands.*—Any person who shall wilfully or carelessly burn grass on lands of which he is the owner or occupier, or which may be otherwise placed under his charge or supervision, and which fire shall extend beyond the boundaries of such property and cause damage to property of any other person, shall be liable to a fine not exceeding Ten Pounds Sterling.*

*See Sec. 2 of Act No. 31, 1895, *post*.

24.—*Penalty for Burning Grass on other People's Land.*—Any person who shall wilfully or negligently burn grass on public lands or property not belonging to him or not being in his occupation or under his superintendence shall be subject to a fine not exceeding Twenty-five Pounds Sterling, or to imprisonment, with or without hard labour, for a period not exceeding six months.*

5.—*Disposal of Fines.*—All fines imposed by this law shall be paid to Her Majesty, her heirs, and successors, and unless remitted shall be applied to the uses of the Government of this Colony:

Provided that the Resident Magistrate may in any case award and direct any portion, not exceeding one-half thereof, to any person or persons who shall have given such information as may have led to the conviction of any offender.

6.—*Person found Firing Grass may be Apprehended.*—Any person found in the act of setting fire to grass not being within land his property or in his occupancy or charge may be apprehended by any Field Cornet, police constable, or land-owner, and forthwith brought before a Resident Magistrate or Justice of the Peace to be dealt with according to Law.

7.—*Party Damified by Grass Burning may sue for Damages.*—Nothing in this Law contained shall have the effect to prevent any person who shall be injured in consequence of the burning of grass to recover damages by a civil action from the offender.

[Dated 24th Aug., 1865.]

LAW NO. 9, 1870.

*"For regulating places of Outspan, and the rights of Travellers with respect to Roads and Outspan Places."***

14.—*Outspan places deemed "public land" within meaning of Grass Burning Law—Law 21, 1865.*—Every outspan place set apart under the provisions of this Law shall, for the purpose of the Second and Sixth Sections of Law No. 21, 1865, entitled Law "To prevent the indiscriminate burning of grass," be considered as public land; and the owner or owners of the farm or piece of land on which such outspan place was established shall, in the event of his or their wilfully or negligently burning grass on such outspan place, be amenable to the provisions of the said Second and Six Sections of the Law No. 21, 1865, aforesaid.

*See Sec. 2 of Act No. 31, 1895, *post*.

**The full text of this Law will be found in Part iv. of Chapter VI.

ACT No. 31, 1895.

"For the Better Regulation of Grass Burning."

Short Title.—"The Grass Burning Act, 1895."

2.—*Operation of the Act.*—This Act shall extend to and be in operation in such Magisterial Divisions of the Colony (including Native Locations in such Divisions) as shall in manner hereinafter provided be by proclamation of the Governor brought under this Act, and when any Division of the Colony shall be so brought under this Act, then Sections 1 and 2 of Law No. 21, 1865, and Section 1 of Law No. 21, 1874,* shall, so far as regards such Divisions, be deemed to be superseded by the provisions of this Act.

3.—*Requisition for Extension of Act to a Magisterial Division.*—In case any fifteen owners of land (erven holders excepted) resident in any Magisterial Division, and holding different farms, shall request the Magistrate of such Division to convene a public meeting of the owners of land in the said Division to be held at the seat of Magistracy, and at a time and place to be stated in such requisition, such Magistrate shall convene a meeting to decide whether such Magisterial Division shall be brought under the provisions of this Act.

4.—*Notice to Convene Meeting.*—The notice convening such meeting shall be published by the Magistrate for a period of at least one month in the *Natal Government Gazette*, and in one local newspaper, and also on the public notice board at the seat of Magistracy.

5.—[Magistrate to preside.]

6.—*If resolution is passed Act may be extended to Division.*—If at such meeting there shall be at least twenty electors, being owners of farms in the Division, and a majority of two-thirds of such electors shall sign a resolution in favour of bringing such Division under this Act, the Governor may, in his discretion, proclaim that the provisions of this Act shall extend and apply to such Division: Provided that if at any such meeting no such resolution shall be carried, it shall not be lawful for the Magistrate of that Division to convene another meeting in such Division for the purpose aforesaid until twelve months shall have elapsed from the date of such meeting.

7.—*Burning Grass on Farms Punishable where Damage Results from Neglect.*—The owner or occupier of any farm in any Division of the Colony to which this Act shall apply setting fire to the grass on his farm shall be bound to take care that no damage results therefrom to the property of any other person, and if he shall neglect to take such care, and such fire shall extend beyond the boundaries of such farm, and shall

*Repealed by Act No. 49, 1898.

cause any damage to the property of any other person, such owner or occupier so setting fire to grass and thereby causing such damage, shall be liable to a penalty not exceeding Ten Pounds Sterling, or imprisonment with or without hard labour for any term not exceeding six months for each offence.

8.—*Punishment for Burning Grass on Another's Land.*—Any person who shall, in any Division to which this Act shall apply, wilfully or negligently burn or ignite, or cause to be burnt or ignited, any grass on public lands or on land of which he is not the owner or occupier, without authority, shall forfeit and pay for every such offence any sum of money not exceeding Twenty-five Pounds Sterling, or be imprisoned in any gaol, with or without hard labour, for any period not exceeding twelve months.

9.—*Firebreaks.*—In every Division of the Colony to which this Act shall apply, the owner or occupier of a farm may, between the 30th day of April and the 15th day of August, make a firebreak as hereinafter defined on any boundary of his farm. Before making such firebreak such owner or occupier shall send to his neighbour, whose land abuts on the site of the proposed firebreak, at least seven days' notice in terms of the schedule annexed, and should such neighbour fail, neglect, or refuse after due notice as aforesaid to join in making any firebreak at the time appointed, then the owner or occupier who has in the first instance delivered such notice may, without being answerable or chargeable with any act of trespass, enter upon his neighbour's land on the day named, and from day to day by himself and his servants, and make or cause to be made or continued a boundary firebreak in terms of this Act, and for every firebreak made by him along his defaulting neighbour's boundary, the person making such firebreak shall be entitled to claim and recover in any competent Court in the Colony recompense for his labour at the rate of Thirty Shillings per mile, to be paid by the owner of the farm.

10.—*Firebreaks, Definition of.*—The firebreaks provided for by this Act may be made on either side or on both sides of the boundaries of the lands affected, and shall not be more than 100 yards and shall not be less than 15 yards in width, and shall be deemed to mean the burning or ploughing of a strip of grass land, and the term neighbour shall embrace all persons being owners or occupiers of lands adjoining the farm of or in the occupation of the person giving notice of firebreak-burning or ploughing.

11.—*This Act not to take away Rights of Action or Liabilities.*—Nothing in this Act contained shall take away or interfere, or be construed to take away or interfere, with the right of any person to sue for and recover at common law, or otherwise, compensation for or in respect

of any damage or injury occasioned by the reckless or negligent use of fire; and this Act shall not exempt any person from any action, suit, or other proceeding which might but for the provisions of this Act be brought against him.

12.—*Prosecutions for other Offences not Barred.*—Nothing in this Act shall prevent any person from being liable to any punishment to which he would otherwise be liable, provided that he be not punished twice for the same offence.

13.—*Interpretation of Terms.*—In construing this Act, the term “Native” shall mean a Native as defined in Law No. 14, 1888*; “owner” includes a registered proprietor, or a lessee for any term, or a trustee holding a property in trust; “occupier” includes any person who is in the actual occupation of, or entitled as owner to occupy, any land alienated from the Crown and all persons being selectors of land on deferred payments; “elector” means a person whose name is on the Voters’ List for the Electoral District.

14.—*N.N.T. and N.G.R.*—The Natal Native Trust and the Department of the Natal Government Railways may each be deemed to be an owner of a farm within the meaning of this Act.

Schedule A.

Form of Notice.

To A.B. [owner or occupier, as the case may be], of the farm
Please take notice that in terms of the Section of the Grass Burning Act, 1895, I intend to commence burning (or ploughing—as the case may be) a boundary firebreak along our joint boundary at [state day, hour, and place].

[Dated 24th Aug., 1895.]

ACT No. 18, 1902.

“To amend and extend the operation of the Grass Burning Act, 1895, and to provide for enquiries into Fires occurring along the Natal Government Lines of Railway in the Colony.”

1.—*Extension of Grass Burning Act to Railway and adjacent lands throughout Colony.*—The Grass Burning Act, 1895, shall, anything in the said Act notwithstanding, extend to and be in operation throughout the Colony, so far as relates to lands occupied by the Natal Government Railway, and to lands through which any such railway runs, or which abut

*Sec. 1 of the Law cited defines the term “Native” as including “all members of the aboriginal races or tribes of Africa, south of the Equator, including liberated Africans, commonly called Amandawo, who are not exempted from the operation of Native Law in terms of Law No. 28 of 1865: Provided that, Griquas and Hottentots shall not come under the provisions of this Law.”

upon railway lands, in same manner as if the said lands, and the Magisterial Divisions in which they may be situated, had been brought under the said Act by Proclamation of the Governor in manner as in the said Act provided; and for the purposes of this Act the Department of the Natal Government Railways shall be deemed to be an owner or occupier of a farm within the meaning of the said Act.

2.—*Inquiry by Magistrate in case of Fire near Railway.*—Whenever a fire occurs on lands abutting upon a railway and damage is caused thereby, then upon the request of any superior officer of the railway, or upon such information being given by any other person as shall satisfy the Magistrate that there is reasonable ground to believe that the fire may have been caused by sparks or coals from a railway engine or through the act of some person working the same, the Magistrate shall hold an enquiry as to the cause of the fire. Such request must be made, or such information must be given, within seven days after the fire.

3.—*Inspection of Scene of Fire.*—The Magistrate shall at once cause the scene of the fire to be inspected and examined, and shall also, if possible, proceed thither and inspect the place himself.

4.—*Taking Evidence.*—The Magistrate shall summon before him all such persons as he may require, and shall examine such persons on oath, and shall take down their evidence in writing.

5.—*Witnesses.*—Any person summoned as a witness, and making default, shall be liable to a fine not exceeding £10 Sterling, and may be brought before the Magistrate under arrest to give his evidence; and for the purpose of any perjury or contempt or the like committed by witnesses, the enquiry shall be deemed to be a judicial proceeding in the Magistrate's Court.

7.—*Expenses and Costs.*—The expenses of the witnesses shall be paid as in criminal cases, and the costs of the enquiry shall be borne by the general revenue.

ACT No. 3, 1905.

"To declare the Law with regard to the proof of Negligence in causes arising out of Fires caused by Railway Engines."

1. In any action for damages sustained by fire occasioned by a railway engine, it shall not be incumbent upon the plaintiff to prove that a fire shown to have been so occasioned was due to the negligence of the Railway Department, or of the owner of a railway not belonging to the Colonial Government, but such negligence shall be presumed unless the contrary is shown, and the onus of disproving negligence shall rest upon the defendant.

Chapter IX.

NATIVE LABOUR LAWS.

[LAWS :—*Master and Servant* : Act 40, 1894 ; Act 49, 1901 ; Act 50, 1901 ; Act 3, 1904 ; Act 12, 1908. *Touts and Touting* : Act 46, 1901 ; Act 1, 1908].

The Laws relating to Native labour may be conveniently considered under two general headings, *viz.*, Master and Servant, and Touts and Touting. Of the Laws the subject matter of which falls under the former of these two categories, Act No. 40 of 1894 and Act No. 49 of 1901 are the most important. The 1894 Act provides that contracts of service, unless specifically stated otherwise, are to be held to be for one month; and no oral contract of service is binding for a longer period than twelve months. Wages must not be paid in kind. The master is held responsible, unless otherwise stipulated in the contract, for the feeding and housing of his servant (see Sections 12 and 49 of 1894 Act), and must pay hospital fees at the lowest rates charged by the hospital, for a period of two months if necessary, in cases of sickness on the part of the servant. Fines are prescribed for misconduct of certain types—see Sections 26, 27, 28, and 29 of the 1894 Act. Imprisonment or payment of fines does not cancel contract of service unless specially ordered by Magistrate (Section 30, 1894 Act).

Act No. 46, 1901, was framed to facilitate the identification of Native servants, and to this end it requires every Native servant (except such as are giving their services in lieu of rent) to take out an “identification pass”; and it also requires every employer of Native labour to keep a labour book in which he must copy the identification pass of each Native in his employ.

I.—MASTER AND SERVANT.

ACT NO. 40, 1894.

“To regulate the relative rights of Masters and Native Servants, and to provide protection for such Servants.”

Short Title: “The Master and Servants (Native) Act, 1894.

2.—*Interpretation of Terms* (Section abbreviated).—In this Act

The word “servant” shall mean—

- (a) Any Native employed for hire, wages, or other remuneration, to perform any handicraft or engage in any bodily labour in agriculture or manufactures, or otherwise, or in domestic service, or as a boatman, porter, miner, driver, herd, or other occupation of a like nature.
- (b) Native employed from time to time for hire on any description of work by or on behalf of the Government of Natal.
- (c) Every Native, not otherwise subject to Military Law, employed as a conductor, driver, leader, labourer, or in any such like capacity by the authorities of Her Majesty’s land or sea forces, serving within the Colony of Natal, whether such person be employed in or by the Commissariat, Ordnance, or any other department or branch of such forces, or employed by any officer acting on behalf of any such department or branch.

The word “master” shall comprise any person, employing for hire, wages, or other remuneration, any Native servant. For the purpose of this sub-section the word “master” shall mean and include the Colonial Government of Natal, and any body corporate, company, society, or individual.

The words “contract of service” shall comprise any agreement whether oral or written, whether expressed or implied, which any servant shall have entered into or made, according to Law, with a master for the performance of any work or labour of any kind hereinbefore mentioned.

The word “month” means the period of thirty days.

5.—*Duration of Contract in Absence of Special Stipulation.*—Every contract of service, whether oral or written, the term of endurance of which shall not have been expressed specifically and limited by such contract, shall, in the absence of sufficient proof to the contrary, be deemed and taken to be for the term of one month from the commencement thereof. [Remainder of section deals with trades and handicrafts.]

6.—*Oral Contracts.*—No oral contract of service shall be valid or binding for any longer term than twelve months from the period fixed for the commencement of the service stipulated for by such contract; and no such oral contract shall be valid or binding in any case, unless it be

stipulated in such contract that the service thereby stipulated for shall be entered upon by the servant, within one month from the date of the contract.

7.—*Written Contracts*.—No written contract of service entered into in this Colony shall be valid or binding for a longer period than twelve months from the date thereof, nor shall any contract for service in writing be valid or binding in any case on any servant, unless the service so contracted for shall be stipulated to commence within the period of one month from the date of the contract, except the contract be signed with the name, or, in case of illiterate persons, with the mark of the contracting parties, in the presence of a Magistrate or Justice of the Peace, who shall satisfy himself by enquiry of the servant that the contract was entered into by the parties voluntarily, and with a clear understanding of its meaning and effect, and shall then, and not till then, subscribe such written contract in attestation of that fact.

8.—*Limit of Duration*.—No such contract so entered into before a Magistrate or Justice of the Peace shall be valid or binding for a longer period than thirty-six months from the date thereof.

9.—*Form of Contract*.—All contracts of service entered into before a Magistrate or Justice of the Peace shall be drawn up as nearly as possible in the form of the Schedule of this Act.

10.—*Determination of Contract*.—No contract of service for a month or any longer period shall be deemed and taken to have expired until at least one month's notice, calculated from, and inclusive of, the day of giving such notice, shall have been given by either of the parties to the other party, unless it shall have been expressly stipulated that no such notice shall be necessary; and when the service shall be a weekly one, a week's notice shall be necessary: Provided that nothing herein contained shall be construed so as to enable any party to any contract of service to determine the same without the consent of the other party, before the expiration of the term of service originally agreed upon.

11.—*Waiver of Notice*.—When any such notice as hereinbefore mentioned shall have been given by either of the parties to the other, and the master shall suffer the servant to remain, or the servant shall remain in his service after the day on which, according to the notice given, the contract of service should expire, such notice shall be deemed and taken to have been withdrawn and passed from, and the contract of service shall continue to endure as long, and in like manner, as if no such notice had been given unless it shall have been otherwise expressly and specially agreed between the parties.

12.—*Food and Lodging*.—[In all contracts, whether oral or written, by which it is stipulated that the servant shall reside on the premises of his master, unless otherwise expressly provided, the master shall be

deemed and taken to have engaged to provide such servant with lodging and sufficient food of good and wholesome quality during continuance of the contract.]

13.—[In case of action for non-payment of wages, the Magistrate may, if necessary, determinate the rate of wages to be paid.]

14.—*Payment in Money or Kind.*—No servant's wages, if contracted for in money, may be paid in kind, or if contracted for in kind, may be paid in money, or in any other than the stipulated kind, except by the express consent of the servant.

15.—*Sickness of, or Accident to, Servant.*—When any servant shall, in consequence of any sickness or accident, be rendered incapable of performing his master's service, he shall not be entitled, in the absence of any special provision in the contract, to receive his wages, except such as shall be already due: Provided that the master shall be bound to provide such servant, if residing or being on his premises, with proper and sufficient food during such incapacity of the servant, for a period of two months, when he shall be at liberty to treat and consider the contract of service as determined and rescinded to all intents and purposes whatsoever.

16.—*Hospital Fees.*—If any servant, being resident on his master's premises, shall be received therefrom into hospital for the treatment of any sickness or accident, the master shall be bound to pay the hospital for the food supplied to such servant at the lowest daily rates charged by the hospital.*

The liability of such master shall not extend beyond a period of two months: Provided, however, that nothing in this section shall be deemed to apply to any case of sickness or accident occasioned by the drunkenness or misconduct of a servant, but such servant, if treated in a hospital for any sickness or accident so occasioned, shall be liable to pay for the cost of his maintenance and treatment therein, and to be sued for such payment.

17.—*Interment of Body of Servant Dying within Borough or Township.*—[In the event of decease of a servant during continuance of his contract of service, whose body may not be claimed within a reasonable time by his relatives or friends, the master of such servant shall cause the body to be decently and properly interred in some place which shall be duly set apart.]

* As amended by Act No. 12, 1908. The amending section of this Act reads as follows:—"The respective rates of one shilling and two shillings a day as fixed by Law No. 3, 1891, and by Sec. 16 of Act No. 40, 1894, to be paid by a master to a hospital on account of a servant received into a hospital shall be altered to the lowest daily rates charged by the hospital in the respective cases of Natives or Indians and of Europeans, and the charges fixed by this Act shall include all charges for food, medical attendance and otherwise."

18.—*Cost of Interment.*—[The cost of such interment shall in the first instance be borne by the master of the deceased servant: Provided, however, that if the deceased should have died possessed of any estate, or entitled to any wages, the necessary cost of such interment shall be a charge by the master against the estate of such servant.]

19.—*Contracts for Services of Wife and Children.*—All contracts of service stipulating for the services of the wife of any servant, together with those of her husband, shall be made or executed by her in like manner as the same shall be made and executed by her said husband: And it shall be lawful for the father, or, in the event of his death or absence, then for the guardian of any child under the age of sixteen years, to contract for the service of such child, in like manner as such person may contract for his own services: and when such contract shall be in writing the name and age of every such child shall be clearly set forth and specified in the contract: Provided always, that nothing herein contained shall give to the master of any such parent any claim on the services of any such child beyond the period for which the parent shall be engaged, nor beyond the period when such child shall attain the age of sixteen, nor to the services of any other child of the contracting parent, whether under colour of such last mentioned child having been fed or clothed by the master, or having been born while the parent of such child was in the said master's service, or under any other pretence whatsoever.

20.—*Death of Husband or Father.*—On the death of any person being at the time, together with his wife and any child, under contract as aforesaid, the contract shall become null and void, with respect to such wife and children, at the expiration of one month after the death of such person.

21.—*Residence of Servant's Family on Master's Premises.*—It shall not be lawful for any person entering into any contract of service by which it is stipulated that the servant shall himself reside on the premises of the master, to keep his wife and children on the premises of his master, unless when the master shall have also stipulated in such contract that this shall and may be done: Provided that, when the master shall have so stipulated, it shall not be lawful for him to claim the services of any such wife or child by reason merely of their residence on his premises.

24.—[Jurisdiction may be given to Justices of the Peace.]

26.—*Offences Punishable by Fine of £2. or Imprisonment for one Month.*—Any servant may be fined any sum not exceeding £2, and in default of payment of the same may be imprisoned, with or without hard labour, for any period not exceeding one month, or may in the discretion of the Magistrate, be imprisoned, with or without hard labour, for any

period not exceeding one month, without the option of a fine, in case he shall be convicted of any of the following acts or instances of misconduct, that is to say:—

- (1) If he shall, after having entered into a contract, fail or refuse without lawful cause, to commence the service at the stipulated time.
- (2) If he shall, without leave or lawful cause, absent himself from his master's premises, or other place proper and appointed for the performance of his work. (Note.)
- (3) If he shall unfit himself for the proper performance of his work, during working hours, by becoming or being intoxicated.
- (4) If he shall neglect to perform any work which it was his duty to have performed, or if he shall carelessly or improperly perform any work which from its nature it was his duty, under his contract, to have performed carefully and properly.
- (5) If he shall refuse to obey any command of his master, or of any person lawfully placed by his master in authority over him, which command it was his duty to obey.
- (6) If he shall make any brawl or disturbance in or at his master's dwelling-house, or on his master's farm, and after being, by his master or any other person placed by his master in authority over him, desired to desist, shall, notwithstanding, continue making such brawl or disturbance.*

27.—*Repeated Convictions*.—[In the case of a second conviction or of more such convictions than a second, within six months after the former conviction, the offender may, in regard to such second or further conviction, be fined any sum up to £3, or be kept at hard labour up to six weeks, and liable to solitary confinement, spare diet, as the Magistrate in his discretion shall adjudge.]

28.—*Offenders Punishable by Fine of £3, or Imprisonment for two Months* (Section abbreviated).—Any servant may be fined any sum up to £3, and, in default, may be imprisoned with hard labour for a period up to two months or imprisonment without the infliction of a fine, with or without hard labour, or be kept in solitary confinement, with or with-

* A native charged under this sub-section cannot be found guilty under Sub-section 5. (Shum v. Unkanka, G.N.L.R., 69.)

out spare diet, in case he shall be convicted in any of the following acts or instances of misconduct, that is to say:—

- (1) If he shall by wilful breach of duty, or by neglect of duty, or through drunkenness, do any act tending to the immediate loss, damage, or serious risk of any property placed by any other person in his charge for delivery to or on account of his master.
- (2) If he shall by wilful breach of duty, or by neglect of duty, or through drunkenness, refuse or omit to do any lawful act proper and requisite to be done by him for preserving in safety and property placed by his master in his charge or placed by any other person in his charge for delivery to or on account of his master. But if it shall appear that such servant is able to pay the damage caused by such act or default as in this section aforesaid, it shall be competent for the Magistrate to proceed under the 45th Section of this Act.
- (3) If, being employed as a herdsman, he shall fail to report to his master the death or loss of any animals placed in his charge, which he shall allege to have died or been lost, on the earliest opportunity for so doing after he shall have discovered such death or loss, or if he shall fail to preserve for his master's use or inspection any part or parts of such animal as he shall allege to have died, which parts he shall by his master have been directed to preserve, unless such herdsman shall prove to the satisfaction of the Court the death of such animals, or if it be made by his master to appear that any such animal alleged by him to have strayed away or otherwise become irrecoverably lost, could not under the circumstances of the case have become irrecoverably lost without his act or default.
- (4) If, being employed in any capacity other than that of a herdsman, he shall allege the loss of any property placed in his charge by or for his master, and it shall be made by his master to appear that the property in question could not have been lost without his act or default.
- (5) If he shall without lawful cause desert from his master's service. (Note.)
- (6) If he shall use any abusive or insulting language to his master, or to his master's wife, or to any person placed by his master in authority over him, calculated to provoke a breach of the peace.

- (7) If he shall, without leave, and for his own purpose, make use of any horse, vehicle or other property, belonging to his master.*

29.—*Repeated Convictions*.—[In case of second or subsequent convictions under the last preceding section, subsequent convictions being within the space of six months next after the former conviction, the fine may be increased to £5 and the imprisonment up to three months, solitary confinement spare diet, etc., as the Magistrate convicting determines.

30.—*Effect of Fine or Imprisonment on Contract*.—No fine paid or period of imprisonment undergone under this Act by a servant shall have the effect of cancelling the contract of service, unless otherwise specially ordered by the Magistrate.

31.—*When Servants may be Arrested*.—If the master of any servant alleging matter of complaint against such servant for any act punishable under this Act, shall make a deposition on oath before a Magistrate or Justice of the Peace, that he believes, stating the grounds of his belief, that in order to secure the appearance of such servant before the Magistrate having jurisdiction to try the case, the apprehension of such servant is necessary, it shall be lawful for such Magistrate or Justice of the Peace to issue his warrant for the apprehension of such servant without previous warning of summons.

Provided, however, that if the master of any servant shall make such deposition maliciously and without reasonable and probable ground for believing the same to be true, such master shall be liable to be fined any sum not exceeding £5, in default of payment thereof to imprisonment for any period not exceeding one month.

32.—*Arrest for Desertion*.—If any servant is charged with having, without lawful cause, deserted from his master's service it shall be lawful for any Magistrate or Justice of the Peace to issue his warrant for the apprehension of such servant without any previous warning or summons.

33.—*Punishment of Boys by Whipping*.—In every case in which a boy not being over sixteen years of age is convicted of an offence under this Act, the Magistrate shall have power to sentence him to receive a private whipping of not more than fifteen strokes with a cane or rod.

Such punishment to be either in addition to or in lieu of any other punishment provided by this Act.

34.—*Refusal to Resume Service after Imprisonment*.—If any servant, whose contract of service still subsists, shall, upon being discharged from prison after undergoing imprisonment under this Act, refuse or

*An arrangement by which a father pledged the services and the labour of his daughter for discharge of a debt was not enforced on a charge of desertion. (*Qondekili v. Mackenzie*, 18 N.L.R., 188.)

neglect, upon his master's request, to resume his service under his contract, he shall be liable to be imprisoned with or without hard labour for any period not exceeding one month, and so on for successive periods, not any of them exceeding one month, until he shall consent to resume, and shall resume his service under his contract; and every such period of imprisonment, or so much thereof as the convicting Magistrate shall adjudge, may be with solitary confinement with or without spare diet, or with spare diet with or without solitary confinement: Provided, however, that no servant shall, under this Act be imprisoned continuously, and without any intermediate resumption of service, under his contract, for longer than six months in all.

35.—*Term of Unlawful Absence and Imprisonment added to term of Service.*—The number of days for which a servant may be absent from his master's service by reason of desertion or unlawful absence, or of imprisonment for an offence under this Act, or during which he may be employed in going to, being at, and returning from a Magistracy in connection with an offence proved against him under this Act, shall be deemed to be added to the term of service originally agreed to, and the term of service shall be incomplete until the expiry of all such added days.

36.—*Obligation to Return to Service after Imprisonment.*—Any servant who shall be tried for an offence under this Act shall return to his master immediately after the trial, or, if sentenced to imprisonment, immediately upon completion of his term of imprisonment; and if he shall not do so he shall be deemed guilty of the offence of being unlawfully absent from his master's premises within the meaning of Sub-section 2 of Section 26 of the Act, and he may be arrested by any constable and brought before the Magistrate and tried summarily, and it shall not be necessary in such a case for the master to lay a complaint or to appear in support of the charge, provided that it sufficiently appear by other evidence that such offence was committed.*

37.—*Deduction of Fine from Wages.*—In any case where a servant shall be fined by a Magistrate and such fine shall be paid by the master, the sum so paid by the master may be deducted from the servant's wages.

38.—*Prescription of Prosecution.*—No servant shall be convicted under any of the foregoing sections of this Act unless the master shall lodge his complaint within three months next after the day on which he became cognisant of the alleged offence.**

39.—*Servant may be Warned to Appear and Answer Charge.*—[In order to save time and expense, the master of any servant may warn and

[* As amended by Act No. 50, 1901.

** As amended by Act No. 35, 1899.

order such servant to appear before the Magistrate: and should he fail to appear, the Magistrate after proof that such warning was given may issue his warrant for the servant's apprehension.]

40.—*Failure of Complainant to Appear.*—Should any complainant who shall have warned any such defendant as aforesaid to appear as aforesaid himself fail to appear at the time fixed by him for the appearance of such defendant then and there to prosecute his complaint, the Magistrate, upon proof by affidavit that such defendant was warned by such complainant to appear at the said time to answer a charge of a certain nature, shall, unless satisfied that such complainant had a good and sufficient reason for failing to appear at such time, ascertain the distance which such defendant shall have travelled, and the distance which any person or persons shall have travelled, whom such defendant shall have brought with him as witnesses, and shall, upon being satisfied that such witnesses would or might have been necessary for his defence, and, after due notice to the complainant, make an order in writing against such complainant for the payment of the expenses of such defendant and his witnesses, if any, at and after the same rate as if each of the said persons had been a witness summoned at the instance of the public prosecutor, and attending to give evidence in the Court of such Magistrate upon a criminal case; and if such complainant shall, upon presentation to him of such order by the person or persons in whose favour the same shall have been made, refuse or neglect to comply therewith, he shall incur and be liable to a fine not exceeding Five Pounds Sterling, and in default of payment of the same to imprisonment, with or without hard labour, for any period not exceeding one month: Provided that one such order may include the expenses of all or any of the persons whose expenses are to be paid, or separate orders may be delivered to one or more of such persons, as may be most convenient.

41.—*Servant may be Ordered to Appear before the Magistrate on Suspicion.*—[It shall be lawful for the master of any servant if he shall have reasonable and probable cause to suspect such servant of having committed any offence against this Act to order and require such servant forthwith to proceed in his company before the Magistrate to answer a charge of having committed such offence; and any servant who shall neglect or refuse to obey any such order may be arrested by his master without warrant and conveyed in custody before the Magistrate.

Provided that no servant shall be bound or obliged to obey such order as aforesaid, unless or until he shall be informed of the nature of the charge his master intends to prefer against him.]

42.—*Failure by Complaining Servant to Appear at Court.*—Should

any servant who shall have complained against his master for or on account of any offence against any of the provisions of this Act, fail to appear at the time fixed by the Magistrate for the appearance of the defendant, then and there to prosecute his complaint, the Magistrate may, unless satisfied that such complainant had a good and sufficient reason for failing to appear at such time, ascertain in the manner in the fortieth section mentioned the expenses and costs which the defendant has reasonably incurred in appearing to answer such complaint, and he shall in the manner in the fortieth section mentioned, and after due notice to the complainant, order the payment by the complainant of such costs and expenses; and if, on the presentation to him of the order therein mentioned by the person in whose favour it is made, such complainant shall refuse or neglect to comply therewith, he shall incur and be liable to the same fine, in default of payment thereof to the same punishment as is fixed in the fortieth section: Provided that one such order may include the expenses of all or any of the persons whose expenses are to be paid, or separate orders may be delivered to one or more of such persons, as may be convenient.

43.—*Merely Leaving to Complain not Unlawful Absence.*—No servant who shall leave the place of his service for the purpose merely of lodging any complaint which he may have against his master, after leave for that purpose shall have been unreasonably refused, shall by reason only of his so leaving be deemed to have deserted his master's service, or to have in any wise contravened this Act.

44.—[Servant summoned under one section may be convicted under another.]

45.—*Damage to Master's Property.*—As often as any property of the master shall be lost or damaged by means of any act or omission of his servant, which act or omission is by this Act declared to be an offence, it shall be lawful for the Magistrate, should he so think fit, and the master shall thereto agree, to ascertain whether such servant is able to make compensation for such loss or damage, and if so, to fix the amount of such compensation, and make such order as to the payment thereof, either at once or by instalments out of wages to be yet earned, or otherwise, as shall seem reasonable and just, and in the meantime, and until default made in such payment, or in the payment of some such instalment, to defer passing sentence upon the party offending; but such Magistrate shall preserve on record the evidence in the case, and, upon application of the master, and proof given, upon oath, of some such default as aforesaid, shall issue his warrant for the apprehension of such servant, and shall pronounce upon him such sentence as, regard being had to the circumstances of the original offence, and to the degree in which

such servant has made, or failed to make, the compensation ordered, shall appear equitable and just.

46.—[On conviction of servant Magistrate may cancel the contract of service.]

47.—[Cancellation of contract on conviction of master for assault.]

48.—*Punishment of Master for Unlawfully Detaining Servant's Cattle.*—As often as the master of any servant shall be convicted of the offence of having, either before or after the expiration of the contract of service upon demand made and without lawful cause, refuse to deliver or permit to be taken away any of such servant's cattle, sheep, goats or other animals, lawfully remaining or being upon such master's land without reasonable and probable cause for believing that the animals in question were lawfully detained, such master shall be fined any sum not exceeding £1 Sterling for every animal so unlawfully detained. [Total fine not to exceed £5. Rest of section deals with punishments, etc.]

49.—*Punishment for not Supplying Food, etc.*—As often as the master of any servant shall be convicted of the offence of failing upon demand to supply or deliver to such servant the food, bedding, or other articles stipulated for in any written contract of service, or of supplying or delivering food, bedding, or other articles not conformable to the said contract, he shall be liable to be fined any sum not exceeding £5, and in default of payment liable to imprisonment for any period not exceeding one month.

50.—*Punishment for Withholding Wages.*—As often as the master of any servant shall be convicted of the offence of withholding the wages of such servant without reasonable and probable cause for believing that the wages so withheld were not really due he shall be fined any sum up to £5, and in default of payment shall be imprisoned up to one month.

51.—*Magistrate may in certain cases Cancel Contract.*—As often as it shall be made to appear to the Magistrate in any case instituted by any master against his servant, or by any servant against his master, that the contract of service has not been faithfully and fairly performed by the respective parties thereto, or either of them, the Magistrate may, should he think fit at the instance of either of the parties, order the cancellation of such contract of service, and the same shall be cancelled accordingly.

52.—*Process of Court without Fees.*—As often as any master shall complain against his servant or any servant shall complain against his master, for or on account of any offence against the provisions of this Act, the process of the Court of the Magistrate for compelling the attendance of the party accused, and of all necessary witnesses shall be instituted at the public charge and without any fees of Court: Provided always, that

if at the trial the charge shall appear to have been brought without reasonable or probable cause, the party complaining shall be liable to a fine not exceeding Five Pounds, and also to defray the costs of process and of the witnesses in the case; and in default of payment of such fine and costs, shall be liable to be imprisoned for any period not exceeding one month: Provided also that such fine may be imposed upon the occasion of such trial, and without any fresh action or proceeding for the recovery thereof.

54.—[Prosecution of persons employed on public works.]

58.—*Prosecution by Servant not Barred by Minority.*—The minority of a Native servant shall not bar the prosecution of any claim by such Native against the master without the intervention of a guardian.

[Dated 30th July, 1894.]

*Schedule.**

Form of Contract of Service.

Be it remembered, that on this day of in the year of our Lord A. B. of and C. D., of appeared before me, E. F. (Magistrate or Justice of the Peace), and in my presence, signed their names (or made their marks, as the case may be) to the following contract of service: The said A. B. agrees to hire the services of the said C. D., and the said C. D. agrees to render to the said A. B. his services at all fair and reasonable times, and in the capacity of for commencing on the day of instant, and terminating on the day of in the year And it is further agreed that the said A. B. shall pay to the said C. D., as such servant as aforesaid, wages after the rate of by the day (week, month, or year, as the case may be), and that such wages shall be paid monthly (or as the case may be).

(Here add any special agreement compatible with the law, and not adverted to in this form.)

(Signed) A. B.
C. D.

The preceding agreement was signed by the above-named parties in my presence, on the day and year above written, voluntarily, the same being, as far as I am able to judge, understood by them respectively.

(Signed) E. F.,
Magistrate.
(or Justice of the Peace).

ACT No. 49, 1901.

"To Facilitate the Identification of Native Servants."

2.—*Interpretation of Terms.*—In this Act:—

"Servant" shall mean any Native employed for hire, wages, or other remuneration to perform any handicraft or engage in any bodily labour in agriculture or manufactures or otherwise, or in domestic service, or as a boatman, porter, m. er, driver, herd, or other occupation of a like nature.

*Referred to in Section 9 of the foregoing Act.

"Master" shall mean any person employing for hire, wages, or other remuneration any Native servant. For the purposes of this Act the word "Master" shall mean and include any body corporate, company, society, or individual.

"Service," "Contract of Service," and the like expressions shall be understood in reference to the foregoing definitions.

3.—*Exclusion of Natives Rendering Farm Service in lieu of Rent.*—

This Act is not to apply to Natives rendering service to a landlord in lieu of rent, when such service is rendered upon the farm on which the Natives live, nor to any other service performed on the land on which they live.*

4.—*Pass under Law 48, 1884, to Suffice for Purposes of this Act.*—

A pass granted to any Native under Law No. 48, 1884, or under any Law or Act for regulating the introduction of labourers into Natal, shall be a sufficient identification pass for all the purposes of this Act, for so long as such remains in force.

5.—*Obligation upon Natives to obtain Pass before taking Service.*—

No Native shall after the commencement of this Act enter into a contract of service, or offer himself for engagement as a servant in this Colony, or (save as is hereinafter excepted) continue in any employ as a servant, or be registered as a togt labourer, or under Law No. 21, 1888, unless he shall have obtained the pass provided for in this Act, and every person intending to engage a Native as a servant shall first require the Native to produce his pass.

Such pass is in this Act referred to as an identification pass.

6.—*Temporary Passes.*—Any Native who is in service at the date of the commencement of this Act, or who, during a term of service, loses his identification pass, may obtain a temporary pass, as hereinafter described, from the office of the Magistrate of the Division where he is employed.

7.—*Pass Officers.*—One of the officers attached to each Magistrate's office in the Colony shall be appointed by Government as a Pass Officer for the purpose of signing and issuing identification passes and temporary passes. In his absence, or if he be prevented from attending, any other officer of the Department may, with the Magistrate's written approval, sign and issue such passes on his behalf.

8.—*Attendance of Pass Officer.*—The officer shall attend daily during the ordinary office hours to receive applications for passes.

9.—*Application for Pass.*—For the purpose of obtaining an identification pass a Native shall attend before a Pass Officer of the Division in which he resides, and shall furnish to the Pass Officer the particulars necessary to be entered in the register.

* See Sec. 4 of Act No. 3, 1904, *post*.

10.—*Enquiry and Decision.*—Before granting an identification pass or temporary pass the Pass Officer shall in every case satisfy himself so far as the circumstances seem to require that the application is proper, and may in his discretion withhold the issue of a pass until he is satisfied that it ought to be granted. In case of doubt the officer may require the Native to be accompanied by his kraal head, or by some accepted person, to testify to his identity, and the correctness of the information given.

No such pass shall be granted if the Pass Officer is satisfied that the applicant is already under a contract of service.

The Secretary of Native Affairs shall have full authority and discretion in any case to order that an identification pass shall be granted or refused.*

11.—*Women and Children.*—The Pass Officer shall not issue a pass to any woman, or to any female child, or to any male child appearing to him to be under the age of fifteen years, without the consent of the husband, parent, or guardian, as the case may be.

12.—*Identification Passes — Particulars of.* — Identification passes with their countersigns shall be printed on durable material, and bound in books.

They shall be numbered consecutively year by year, and the register thereof shall be kept in such manner as may be prescribed by the Secretary for Native Affairs.

Every Native to whom the identification pass is issued shall keep it always in his possession, and shall exhibit it whenever called upon to do so by his master, or by a police officer or constable.

Every master employing a Native servant, other than a registered togt labourer, shall keep a labour book, in which he shall copy the identification pass of every Native whom he may employ.

The master shall on no pretext keep a servant's identification pass, unless with the consent of the Native.

13.—*Employment of Servant not having Identification Pass an Offence.*—If any man employs a Native servant without such servant having produced his identification pass he shall be guilty of a contravention of this Act †

14.—*Form and Duration of Temporary Pass.*—A temporary pass shall in no case exceed six months, but it may be renewed upon the Pass Officer being satisfied that the former contract of service still subsists.

A temporary pass shall not be available for the purpose of any new contract of service.

*This last paragraph was added by Act No. 30, 1904.

† Amended Section (by Act No. 3, 1904.)

15.—*New Pass to Replace Lost Pass.*—A Native who has lost his identification pass may obtain a fresh pass from the office in which the former pass was issued, upon satisfying the Pass Officer of the fact, and upon payment of a fee of one shilling.

This payment shall not be required in the case of a temporary pass to take the place of an identification pass lost during service.

16.—*Change of Residence.*—If any Native who has obtained an identification pass in one Magisterial Division shall change his residence to another Division he shall present his pass to the Pass Officer of the Division into which he has removed. The Pass Officer shall record the pass, and inform the officer by whom the pass was issued, who shall record the change of residence.

17.—*Record by Pass Officer of Convictions of Certain Crimes.*—If a Native who is in service is convicted of any of the crimes to which this section applies, the Clerk or Registrar of the Court shall, as soon as conveniently may be, inform the Pass Officer by whom the pass was issued of the particulars of the conviction and sentence, and such officer shall record the same, and shall make a note thereof against the entry of registration.

This section shall apply to all crimes of the following classes or akin thereto: Theft, fraud, rape, and all crimes of indecency.

18.—*Rules.*—The Governor in Council may from time to time make rules for the purpose of carrying out the provisions of this Act, and for regulating any matters necessary for giving full and complete effect to the same. All such rules shall be published in the *Natal Government Gazette*.

19.—*Offence of being in Service without a Pass.*—Any Native who shall after the first day of January, 1902, enter into a contract of service, or be or continue to be in service without having an identification pass, as required by this Act, shall be guilty of a contravention of this Act.

20.—*Other Offences.*—The following shall also be contraventions of this Act:—

Making any false statement or pretence for the purpose of obtaining or assisting anyone to obtain an identification pass, or a duplicate or copy thereof.

Using a false pass, or one belonging to another person, for the purposes of deceit.

Using any deceit for the purpose of evading the provisions of this Act.

The withholding of a Native's identification pass.

21.—*Jurisdiction over Offences.*—All contraventions of this Act, or of any rules thereunder, shall be cognisable in the Courts of Magistrates.

and shall be punishable according to the ordinary criminal jurisdiction of the said Courts.

ACT No. 3, 1904.

“To amend Act No. 49, 1901, entitled Act ‘to facilitate the Identification of Native Servants.’”

1.—*Principal Act to Apply to Others as to Servants.*—Act No. 49, 1901, shall apply to Natives of the undermentioned classes in the same manner as to servants:—

Policemen,
Persons in service as messengers,
Natives engaged in washing and laundry work,
Jobbers,
Ricksha pullers.

2.—[Amendment of principal Act—which has been carried out.]

3.—[Amendment of principal Act—carried out.]

4.—*Issue of Passes to Native Tenants under Obligation to render Service in lieu of Rent.*—Notwithstanding the provisions of Section 3 of Act No. 49, 1901, in cases where a Native tenant has agreed with his landlord to render service to the landlord, it shall be lawful for either party to require the other, on reasonable notice, to attend, and he shall be bound to attend, before a Magistrate, and when the Magistrate shall have ascertained the agreement between the parties, he shall destroy any existing identification pass and issue to the Native a new identification pass, endorsing on such new pass the period during which the Native is to render service to the landlord, and during such period no person other than the landlord shall be entitled to hire the services of such Native. The appearance of the landlord before the Magistrate may be by himself or by an agent, or by delivery of the landlord's statement in writing of the terms and period on and during which the Native has agreed to render service. It shall be the duty of the Magistrate to satisfy himself that the Native agrees to the terms. Any notice under this section by a landlord to a Native shall not be taken to have been effectually given unless personally served or unless left at the kraal of such Native at a time when the Native is on the farm where his kraal is situated.

Whenever a Native shall cease to reside upon private land he shall, on giving satisfactory proof and on surrendering his endorsed pass to a Magistrate, be entitled to obtain a new identification pass, and whenever a Native shall move from the land of one private owner to another the Native appearing before the Magistrate with the new landlord shall,

upon the surrender of his existing pass, be entitled to the issue of a new pass with the endorsement of the period, if any, during which the Native is to render service to the landlord.

5.—*Repeal of Schedules.*—Schedules A and B of Act No. 49, 1901, and the references thereto in the Act, are hereby repealed. Passes shall be in such form as may be prescribed by rules.

6.—*Cancellation of Pass upon Conviction.*—Upon the conviction of any person for having obtained or used a pass in contravention of Act No. 49, 1901, the Magistrate may declare such to be null, and order it to be produced to him and cancelled.

7.—*Punishment for Contravention of Sections 2 and 4.*—If any person contravenes the provisions of Sections 2 or 4 hereof, he shall be liable to a fine not exceeding Five Pounds (£5) Sterling, failing payment of which he shall be liable to imprisonment for a period not exceeding one month, with or without hard labour.

8.—*Construction of Act.*—This Act and Act No. 49, 1901, shall be read and construed together as one Act.

[Dated 28th March, 1904.]

II.—TOUTS AND TOUTING.

ACT No. 46, 1901.

“To Repeal, and Re-enact with Amendments, the ‘Labour Tout Regulation Act, 1896.’”

Short Title: “The Touts Act, 1901.”

2.—(Act No. 36, 1896, repealed.)

4.—*Definition of “Tout.”*—The expression tout shall mean any person who shall, by himself or by any person employed by him, and whether in his own name or otherwise, procures or attempts to procure, seek for, or engage Natives in this Colony for service to be rendered to another person, or shall supply, or contract to supply, Natives to be employed in work of any kind.

Services shall be deemed to be rendered to another person if the Natives are employed in or about the business of another person, whether or no any agreement may have been made under which the Natives are paid by the person who procured them, or are regarded as being his servants, and notwithstanding any other agreement which may be made with a view to avoiding the effect of this section.

5.—*Employees in Touting Business also deemed Touts.*—Any person employed to procure, seek for, or engage Natives shall also be deemed to be a tout. Nevertheless, if any person charged with touting without a license shall satisfy the Court that he was merely incidentally employed

to engage servants for domestic, farm, or other personal service for his employer, and not in any way making a business of procuring Natives or acting for or in the business of a tout, he shall be acquitted.

6.—[Repealed by Act No. 1, 1908.]*

7.—*Annual License*.—Every tout shall take out an annual license from the Magistrate of the Division in which he intends to procure, engage, or seek for labourers and servants, and this license has neither effect or validity outside the Magisterial Division in which it is granted.

8.—*Discretion in Issue of License*.—Such licenses shall be issued only to persons approved by the Magistrate, who may refuse to issue any license.

9.—*Appeal against Refusal*.—Any person who is refused a license may appeal to the Secretary for Native Affairs, who may direct the Magistrate to issue a license or uphold the refusal to grant the license, without being required to give any reasons for his decision.

10.—*License Fee*.—The charge for every such license shall be Five Pounds Sterling for each year, or portion of a year, ending on the 31st day of December.

11.—*License not Transferable*.—No such license shall be transferable.

12.—(Every contract made with Natives by a tout or labour agent to cease on entry of Natives into service.)

13.—(Employees of Natives supplied by touts to such Natives registered by a Magistrate or Justice of the Peace. Penalty for non-compliance with this Section is £5.)

15.—*Unlicensed Touting*.—Whoever shall procure, or attempt to procure, apply, or seek for Natives, or otherwise act as a tout within the meaning of this Act, without being provided with a license, shall on conviction thereof be liable for every such offence to pay a fine not exceeding £25 sterling, or in default imprisonment with or without hard labour not exceeding six months.

16.—*Permission Required before Entry on any Land for Touting*.—No tout or labour agent shall enter any private or Crown Lands or Native Location, without having first obtained the consent of the resident owner, or in case of non-resident owner of his agent, or in case of Crown Lands and Locations, the consent of the Magistrate.

Any person contravening this section shall be liable to a fine not exceeding £20 Sterling or imprisonment, with or without hard labour, not exceeding three months.

17.—*Enticing Servants from their Employment*.—Whoever shall, whether licensed as a tout or not, directly or indirectly, either by himself or by an agent, by the offer of higher wages or greater benefits, or by

*See Secs. 3 and of Act No. 1, 1908, *post*.

any other means, cause, induce, or persuade (or attempt to do so, or aid or assist to do so) any servant by words or by any other means to leave his service, or to violate any agreement of service, in writing or not, whether such service is actually being performed or has to be performed at some future time, shall, on conviction thereof, be liable to a fine of £25 Sterling or imprisonment not exceeding six months, and forfeiture of any license held under this Act. In case of a contravention of this section by any person acting in the employ of a tout, such tout shall also be deemed guilty of such contravention, and all persons so liable may be prosecuted together or separately.

It shall not be a defence to any charge under this section that the accused person did not know that the servant or apprentice was in the employment or agreement of service.

18.—*Harbouring Deserting Servants or Apprentices.*—Every person who shall conceal, employ, or retain, or counsel, aid, or abet in concealing, employing, or retaining any servant or apprentice who shall have deserted from the service of any master, or otherwise absconded or absented himself from such service, shall on conviction pay a fine not exceeding £25 Sterling, or, in default, imprisonment up to six months, with or without hard labour, and, if licensed under this Act, to forfeiture of license.

19.—*Penalty for not Exhibiting License.*—If any licensed tout shall on demand at any time by any Magistrate, Justice of the Peace, constable or officer of the law, refuse to produce or to show his license, he shall, on conviction, be liable to a fine of Five Pounds Sterling or to be imprisoned for any term not exceeding three months.

20.—*Act not to be bar of other Remedies.*—This Act shall not exempt any person from any action, suit, or other proceeding which might, but for the provisions of this Act, be brought against him.

21.—*Exemption of Persons in Service of Crown.*—Nothing in this Act shall apply to any person who as regards any of the matters referred to in this Act, is engaged solely by and in the immediate service of His Majesty's Imperial or Colonial Government.

ACT No. 1, 1908.

"To Amend the Touts Act, 1901."

1.—*Interpretation of Terms.*—In this Act—

- (a) The words "*labour agent*" shall mean and include any person who engages, procures, solicits, or recruits Natives under a "Special License," under the provisions of this Act, for services to be rendered outside the Colony.

- (b) The word "servant," "tout," or "runner" shall mean and include any person touting, procuring, seeking or soliciting or recruiting Natives for any labour agent.

2.—*Repeal*.—Section 6 of the Touts Act, No. 46, 1901, is hereby repealed.

3.—*Prohibition of Touting for Service Outside Natal*.—No person shall except under the provisions of this Act

- (a) Tout for or recruit or engage a Native for any services to be performed outside this Colony;
- (b) Take out of this Colony or directly or indirectly induce a Native to leave this Colony for the purpose of performing any service outside the Colony.

This section shall not apply to a person taking out of the Colony a Native, who is actually in his service at the time, for the purpose of performing domestic or farm work out of the Colony for such person, the *onus probandi* whereof shall be on such person.

4.—*Special License*.—Any labour agent who may desire to tout for and engage Natives for services to be performed outside this Colony may, upon application to the Minister for Native Affairs, obtain a "special license." The granting or refusing of such license shall be in the sole discretion of the Minister.

5.—*Requisite Age of Native*.—No Native shall be touted for, engaged or recruited who is not of an age to subject him to the payment of the Poll Tax or Hut Tax.

6.—*Scope of License*.—No license under this Act shall be granted except in reference to Native Locations, Native and Mission Reserves, and unalienated Crown Lands: Provided that a license may be granted for recruiting on a private farm if the owner in writing signifies his consent thereto.

7.—*License Subject to Regulations*.—A license issued by the Minister for Native Affairs under this Act shall be endorsed "Special License," and shall be subject to such rules and regulations as may hereafter be provided under the authority of this Act.

8.—*Charge—License not Transferable*.—The charge for every "Special License" shall be Fifty Pounds (£50) for each year or portion of a year ending 31st December. Such license, which shall not be transferable, shall enable the holder to engage, procure, solicit, or recruit Natives in all the places mentioned in Clause 6 hereof, but not elsewhere.

9.—*Residents in Natal only Eligible for License*.—No person shall be eligible for a license as a labour agent or tout or servant or runner unless he be a *bona fide* resident in Natal.

10.—*License for Servants, etc.*—If any such labour agent or person shall desire to engage for the conduct of his business other persons as servants, touts or runners, he may obtain from any Magistrate in the area or areas covered by the “Special License” held by him, a license for such servant, tout or runner. For every such license there shall be payable a registration fee of Three Pounds (£3) per annum, and it shall be a condition of the licensing of such servant, tout or runner, that he shall wear a conspicuous badge on his arm at all times when engaged in such duties, and such badge shall have stamped thereon the initials of the employer. Every such servant, tout or runner, shall be confined in his operations to the area covered by the license issued to his employer. Should such servant, tout or runner be other than a Native, he shall be exempted from the necessity of wearing a badge.

11.—*Conditions of License and Security.*—The Minister may in his sole and absolute discretion impose such conditions and restrictions as he may think fit before granting a license, and no such license shall be given unless the applicant shall first enter into a bond with two approved sureties in the sum of One Hundred Pounds (£100) each, and the applicant himself in One Hundred Pounds (£100) for the proper fulfilment of the conditions of his license and for the performance by his servants, touts, or runners of all obligations and conditions of such their service and for any penalty inflicted on them or any of them for the breach of such conditions. The Minister may at any time revoke and cancel any “Special License”; and notice in writing under his hand to that effect shall be final and conclusive.

12.—*Registration of Contract of Natives Procured for Service Outside Colony.*—No Native recruited under this Act shall be taken out of the Colony unless he shall have first gone before the Magistrate of his district and had registered the terms of the hiring contract and given the number of the identification pass of the Native, and such contract shall provide that the Natives shall receive month by month the wages earned by them without any deduction for advances made to such Natives by the said labour agent or otherwise: Provided always that in respect of any *bona-fide* cash advances made by the said agent to any such Natives provision may be made by which the repayment of such advances with interest not exceeding threepence in the £ per mensem or 15 per cent. per annum may be made by monthly instalments from the wages earned by such Natives.

13.—*Certain Contracts Illegal.*—Any contract by which a labour agent or other person takes servants out of the Colony and supplies such servants to employers of labour in any place outside the Colony at a

greater amount of wages than those agreed to be paid by such labour agent shall be and is hereby declared to be illegal.

14.—*Contraventions.*—Every person found guilty of a contravention of this Act, or of the regulations made thereunder, or of any conditions applicable to a special or other license, shall be liable, on conviction before a Magistrate, to a fine not exceeding One Hundred Pounds (£100), or, in default of payment thereof, to imprisonment not exceeding six months with or without hard labour.

Any offence committed under this Act shall be cognisable by the Magistrate in whose Division the offender may at any time be found.

15.—*Construction of Acts.*—This Act and the Touts Act, 1901, shall be read and construed together as one Act.

[Dated 20th Jan., 1908.]

Chapter X.

INDIAN LABOUR LAWS.

[LAWS.—Law 25, 1891 ; Act 1, 1900 ; Act 8, 1901 ; Act 39, 1905.]

There is a large body of Laws dealing with Indian labour and its importation into Natal, but the four Laws above noted are the only ones which I have considered of sufficient general interest to farmers to deal with here. The first of these (Law 25, 1891) deals with the treatment of immigrants, and prescribes punishment for misconduct. Act 1 of 1900 empowers to the Protector to cause an immigrant who has come to lay complaint to be taken back to his employer, and prescribes punishment for refusal to obey the Protector's orders in this regard. Act No. 39 of 1905 deals with the employment of unlicensed Indian immigrants; and Act No. 8 of 1901 extends certain Laws and Acts relating to Indian immigrants to Zululand.

LAW NO. 25, 1891.

“To Amend and Consolidate the Laws relating to the Introduction of Indian Immigrants into the Colony of Natal, and to the Regulation and Government of such Indian Immigrants.”

(Amended by Act No. 17 of 1895, Act No. 27 of 1895, Act No. 21 of 1897, and Act No. 1 of 1900.)

2.—*Appointment of Protector of Indian Immigrants.*—The Governor may from time to time appoint some fit and proper person to be Protector of Indian Immigrants, also an Assistant Protector, and may also appoint a Deputy Protector.

10.—*Engagement to be Entered into by Immigrant in India.*—Every Indian immigrant leaving India to come to Natal for hire shall, before leaving India, either be engaged to an employer named in his contract or shall be taken as bound to serve any employer to whom he shall be allotted by the Protector on his arrival.

11.—*Period of Service.*—The period of service shall in each case be for five years.

24.—*Days and Hours of Labour.*—Every such Indian immigrant whose services shall be so assigned or transferred, in the absence of express agreement to the contrary, shall be bound to work for such person

to whom his services may have been assigned for nine hours of each day, Sundays, Good Friday, Christmas Day and New Year's Day only excepted.

25.—*Immunity of Field Labourers from Work on Sundays save in Cases of Necessity.*—No Indian immigrant engaged for field labour shall be compelled to perform any work on any Sunday or holiday save only such as shall be of immediate necessity for the care and feeding of animals, cleanliness of yards, stables, buildings, etc., etc., and other work indispensable for the preservation of the property of his employer. Such work shall not be of more than two hours' duration nor be continued after the hour of eight in the morning.

30.—*Absence Without Leave: Liability of Arrest.*—It shall be lawful for every person entitled to the services of any Indian immigrant, or for any servant of such person, or for any constable, to apprehend without a warrant such immigrant being found at a distance of more than one mile from the residence of the person in respect to whom his services shall be due without a written ticket of leave signed by the master or some person duly authorised by him, and to cause such immigrant to be taken back to such residence: Provided that every Indian immigrant shall be free from such arrest if, when so found, he shall be on his way to lodge any complaint before the Protector of Indian Immigrants or Magistrate of the Division wherein his place of service is situated.

31.—*Immigrant may be Stopped and Required to Produce Certificate of Discharge or Pass, and in Default brought before the Magistrate.*—It shall be lawful for the Protector of Indian Immigrants, or Magistrate, Justice of the Peace, or Police Constable, to stop any Indian immigrant whenever he may find him, and also for the owner or occupier or his servant to stop any such immigrant, and if such immigrant shall fail to produce his certificate of discharge, or a pass signed by his master or some person authorised by him, save in exceptional cases, as provided in Section 30, to take such immigrant forthwith before the nearest Magistrate, who shall at once inquire into the case. Unless such immigrant shall satisfy the Magistrate that he has obtained his discharge, or is absent from his master's estate with leave, in writing. Penalty for first offence fine not exceeding Ten Shillings or seven days' imprisonment, with hard labour, for second offence imprisonment not exceeding fourteen days, with hard labour, and for subsequent offences imprisonment, with hard labour, not exceeding thirty days.

The Magistrate who convicts shall inform the master or employer of immigrant so convicted of the conviction, and on expiration of imprisonment shall return the immigrant to his master or employer.

34.—*Justifiable Absence.*—Every immigrant during absence from work by reason of sickness or bodily infirmity shall be supplied by his

employer with food, shelter, and medicine, but shall be liable to deduction of fourpence a day from his wages.

35.—*Punishment for Absence Without Leave, Neglect of Work, or Disobedience.*—Any Indian immigrant who being in good health and able to work shall absent from muster or roll call without leave, or who shall neglect to perform any work which his employer or person duly authorised by him may reasonably order him to perform, or who shall, without just cause, wilfully disobey the orders of his employer, shall be deemed guilty of misconduct, and shall be punishable by the Magistrate of the Division wherein his place of service is situated by imprisonment, with or without hard labour, for any period of seven days for the first offence, for fourteen days for second offence, for thirty days for subsequent offence, with spare diet if the Magistrate shall so adjudge.

36.—*Punishment for Gross Insolence, Fraud, or Damage to Employer's Property.*—Any Indian immigrant who shall be grossly insolent to his employer, or who shall practise any fraud or deception in the performance of any work which he is bound to perform, or who by negligence or other improper conduct lose, throw away, or damage the property of his employer, shall be punishable by the Magistrate by a fine not exceeding Five Pounds, or by imprisonment, with hard labour, up to thirty days.

37.—*Punishment for Second Offence, or for Careless Use of Fire, Cruelty to Stock, etc.*—Any Indian immigrant who may be found guilty a second time of any offence specified in the foregoing section, or who shall endanger the property of his employer by the careless use of fire or who shall wilfully maim, wound, or cruelly ill-use any live stock or cattle, or who shall by negligence suffer any stock to be maimed or wounded, shall be punished on conviction before a Magistrate with hard labour up to three months and spare diet: Provided that this does not debar a prosecution in the Supreme or Circuit Court under the Common Law of the Colony.

38.—*Immigrants found on Premises without a Pass.*—Any person on whose premises any assigned immigrant may be found without a pass may send information to the Protector, Deputy Protector, or nearest Magistrate or Resident Magistrate, who shall have such Indian arrested and brought before him to be dealt with according to the provisions of this Law.

56.—*Immigrants Showing Unwillingness to go to Hospital.*—If an indentured Indian immigrant who is affected with any venereal disease shall not willingly go to hospital, he may be arrested and detained in custody, and taken before the Magistrate of the Division as soon as possible.

59.—*Exemption of Immigrants from Debts, etc.*—No Indian immigrant shall be at any time liable to any action at law for the recovery of debt during the time of indenture, and no Indian immigrant whilst under indenture shall be liable to imprisonment for debt, nor can any creditor lawfully attach wages, or levy on goods during the continuance of such indenture, any Law to the contrary notwithstanding.

85.—*Punishment for Adultery, Seduction or Abduction.*—Any Indian immigrant who shall commit adultery with the wife of any immigrant, married under this Law, or who shall cohabit with any unmarried Indian immigrant girl under 13 years of age, or who shall entice or abduct her from the custody of her parents or lawful guardians, shall upon conviction be liable to a fine not exceeding £10, or imprisonment up to 30 days, or to fine and imprisonment.

87.—*Punishment for Offences by Wife or Unmarried Girl.*—It shall be lawful for the Magistrate to order and adjudge a wife so committing adultery, or an unmarried girl under 13 years of age so cohabiting or eloping without the consent of her parents or guardians, to imprisonment, with or without hard labour, for any period not exceeding 30 days.

90.—*Immigrants not to Leave Colony without License.*—It shall not be lawful for any Indian immigrant introduced into the Colony at expense of the Indian Trust Board to depart from the Colony without a license in writing signed by the Protector of Immigrants.

94.—*Punishment for Employer's Neglect.*—Every employer who shall neglect to supply proper medicine or nourishment to any immigrant when sick, or who shall ill-treat any immigrant or fail or neglect to supply him with food or pay his wages shall on conviction be fined £10 Sterling for every offence, or in default may be imprisoned for 30 days.

95.—*Punishment for Obstructing Protector.*—Every person who shall obstruct the Protector of Indian Immigrants or other person duly authorised, shall wilfully do any act to prevent or obstruct an inspection of the state and condition of any Indian immigrant, shall be liable to a fine of £10 and imprisonment up to 30 days.

97.—*Harbouring Indian Immigrants.*—If any person shall harbour or receive into his employment any Indian immigrant to whose service any other person may be entitled, such person shall, upon conviction, forfeit the sum of £10, or be liable to imprisonment for a term not exceeding three months.*

98.—*Penalties for Harbouring.***—Any person who shall harbour or receive into his employ any Indian immigrant, male or female, whose indenture has not expired, or who may have been assigned to any other

* See Act No. 3, 1907, *post*.

** "Harbouring," applies to a person allowing an immigrant to live on the premises, though not employing him. Roberts, Protector of Immigrants. 6 N.L.R. 37.

person, shall be liable to the penalties in Section 97, unless such immigrant shall have been duly assigned to such person by the Protector of Indian Immigrants. That half the penalty of £10 be awarded the informer; and that nothing in this clause shall apply to any Indian, male or female, who has a proper pass, the period of leave in which is then unexpired.

Section 100.—Punishment for Sending or Taking Immigrants out of the Colony, etc.—Any person who shall send or take out of the Colony, or endeavour to send or take out of the Colony, or induce to leave the Colony, or harbour or receive with the intention of taking out of the Colony, any Indian immigrant whose name shall appear in the register, and who shall not have obtained a license from the Indian Immigration Trust Board to depart from the Colony, shall upon conviction, pay the sum of £20 for each and every such Indian, and in default, may be imprisoned, with or without hard labour, for any term not exceeding three months.

101.—Punishment for Large Number of Immigrants Absenting Themselves to make Complaints.—When all or a large number of Indian immigrants shall absent themselves from their employment without leave, for the purpose or pretence of making any complaint against their employer, such Indians, or any number of them, shall be liable to be brought before any Court, and on conviction punished by fine not exceeding £2, or to imprisonment not exceeding two months, with or without hard labour, whether such complaint shall not be adjudged to be groundless or frivolous, and notwithstanding that such complaint may be successful.

102.—Punishment for False Pretences as to Completion of Residence, etc.—Any Indian immigrant who shall falsely and fraudulently pretend that he has completed a residence of ten years in the Colony, or who shall use as his own any certificate of residence or discharge belonging to any other immigrant, or who shall lend or pledge same, or willfully counterfeit or alter any such certificate, shall, on conviction before any Court, be imprisoned, with or without hard labour, for terms not exceeding three calendar months.

103.—Cleanliness of Dwelling Places.—Any Indian immigrant who shall keep his dwelling-house or premises in such a condition as to be a nuisance, and injurious to health, shall be liable to a fine not exceeding £5, or imprisonment, with or without hard labour, not exceeding one month.

104.—Prosecutions for Harbours.—All prosecutions for harbouring Indian immigrants shall be made at the instance of the employer entitled to the service of such immigrant.

106.—*Certificates of Discharge.*—Every immigrant who may have completed, or who may hereafter complete, the term of service under indenture, for which he was indentured on leaving India for this Colony, or whose indenture may have been or may hereafter be duly cancelled, shall be entitled to demand and receive from the Protector of Indian Immigrants, free of charge, a certificate of discharge from service, and the possession of such certificate shall release such immigrant from further service in this Colony under indenture. This does not apply to Indians introduced under indenture in pursuance of Act 17, 1895.

109.—*When Immigrants come under Master and Servants Law.*—Upon expiration of first five years after introduction into this Colony, every Indian immigrant who shall have served under contract of service shall be at liberty to hire and dispose of his services, and the Law for masters and servants shall apply to such Indians and their employers, save such Indians who shall elect to be re-indentured. This does not apply to Indians introduced in terms of Act 17, 1895.

118.—*What persons are included in the operation of this Law.*—The words "Indian immigrant" shall mean and include all Indians introduced from India to Natal under the laws regulating such introduction, and those descendants of such Indians who may be resident in Natal. From the operation of this Law are excluded those persons who are usually described in this Colony as "Asiatics," "Arabs," or "Arab traders," being persons who have not been introduced into this Colony under the Laws providing for the introduction of emigrants from India to Natal.

ACT No. 1, 1900.

2.—*Protector may cause Immigrant who has come to lay Complaint to be taken back to his Employer.*—It shall be lawful for the Protector, or in his absence the Assistant Protector, or any Magistrate, to cause any Indian immigrant who shall have made his complaint as provided in Section 30 of Law 25 of 1891 to be taken back to his employer by messenger, and the cost of such messenger shall in the first instance be paid by the employer, and shall be borne by the employer unless the Protector or Magistrate shall be of opinion that the complaint made was frivolous and unfounded, or otherwise that the Indian immigrant was not justified in leaving his employer's premises without permission, and shall then so inform the employer, in which case the employer is hereby authorised to deduct from the wages of the Indian immigrant the cost incurred in providing for his safe return to his employer as provided in Section 30 of Law 25 of 1891; and further the Indian immigrant shall be liable in such case to be punished for illegal absence as provided in Section 35 of Law 25 of 1891.

3.—*Immigrant Declining to Return, guilty of Offence.*—Should any Indian immigrant decline to return to his employer when so directed, as provided in the preceding section, he shall be deemed guilty of contravening Section 31 of Law 25 of 1891, and shall be dealt with accordingly, and every subsequent refusal shall render him liable to further punishment under the same section.

ACT No. 8, 1901.

"To extend the Law and Acts Relating to Indian Immigration to the Province of Zululand."

1.—The Law and Acts enumerated in the Schedule to this Act shall extend to, and be of force in, the Province of Zululand, subject to the provisions of Section 7 of Act No. 17 of 1898.*

[The following are the Law and Acts enumerated in the Schedule above referred to:—Law No. 25, 1891; Act No. 36, 1894; Act No. 37, 1894; Act No. 17, 1895; Act No. 34, 1895; Act No. 7, 1896; Act No. 14, 1897; Act No. 28, 1897; Act No. 19, 1898; Act No. 21, 1898; and Act No. 1, 1900.]

ACT No. 39, 1905.

"To amend Act No. 17, 1895, entitled Act 'To amend the Indian Immigration Law of 1891.'"

2.—*Employment of Unlicensed Indian Immigrants.*—No person shall employ, whether as a servant or as an employee in any other capacity, any Indian Immigrant who is required by Act No. 17, 1895, or by Act No. 2, 1903, to take out an annual pass or license to remain in the Colony, unless such Indian shall first produce to him the pass or license then current, nor shall he retain such Indian as an employee in any year thereafter unless such pass or license shall have been taken out before the 15th day of July in each year.

*Act "to apply certain of the Laws of the Colony of Natal to the Province of Zululand, and to amend and declare the construction of the Laws heretofore in force in the said Province." Section 7 provides that nothing contained in any of the Laws or Acts which are by this Act (17 of 1898) extended to Zululand shall be deemed to have the effect of extending the jurisdiction of the Supreme Court of Natal to Zululand until a special Act for that purpose has been passed by Parliament.

3.—*Penalty.*—Any person contravening this Act shall be liable, for every month or part of a month in which he shall have unlawfully employed an Indian Immigrant, to a fine not exceeding Five Pounds (£5) Sterling.

4.—*Contracts in Contravention of this Act Invalid.*—No person shall have the right to enforce at Law any contract of service made or continued in disregard to this Act, or to charge the Indian so employed with any offence under the Law relating to masters and servants.

5.—*Payment of Fee by Employer.*—An employer may himself pay the fee due for a pass or license under Act No. 17, 1895, or under Act No. 2, 1903, for an Indian immigrant employed by him, and may deduct the amount so paid from the wages of the Indian.

[Dated 2nd Dec., 1905.]

Chapter XI.

NATIVES—MISCELLANEOUS MATTERS.

[LAWS, ETC.—*Native Gatherings*: Regulations under Act 5, 1898. *Loans to Natives*: Act 41, 1908.]

The regulation of Native beer-drinks and gatherings is provided for by Rules framed under Act No. 5 of 1898. Act No. 41 of 1908 deals with claims against Natives for interest, under which we find, *inter alia*, that, unless there is an instrument in writing, claims for interest are irrecoverable in a Court of Law; that documents must be signed by a Magistrate or Justice of the Peace; and that not more than 15 per cent. per annum is recoverable by Law in the way of interest. Reference should also be made to the note at the end of this chapter in regard to liquid documents of debt.

I.—NATIVE GATHERINGS.

NATIVE BEER DRINKS AND GATHERINGS.

Rules framed under Section 2, Act No. 5, 1898.

(Published under Government Notice No. 32, 1903.)

1.—*Prohibited Beer Drinks*.—The two following forms of beer drinking assemblies are prohibited:—

- (a) Where “Utywala” (Kafir beer) is retailed at so much per measure.
- (b) Where the assembly for drinking Utywala is commonly known as “Ilimiti” or tea meeting, and where, on payment of a prescribed fee for admission, Utywala is supplied free of any further charge.

2.—*Interpretation of “Public Beer Drinks.”*—The two following forms of beer-drinking assemblies are declared to be public:—

- (a) Where an assembly at which Utywala or Ijiki is supplied by the host given to celebrate a marriage, the “Ungonqo,” “Ukomulisa,” “Icamba” betrothals and other occasions of a like nature at which the Native public make it a practise and are allowed by custom to attend.
- (b) Where an assembly is held to entertain by the supply of such beverages Natives who have assisted and done work for the host in connection with ploughing, hoeing, etc., hut and kraal building, and the like.

3.—*Family Brew Private.*—The family brew, to which if any other persons but members and near relatives of the family are present, they are there by the personal invitation of the host or giver of beer, shall be regarded as a private beer-drinking assembly.

4.—*Sections of Different Tribes not to be Invited.*—Public and private beer-drinking assemblies shall not be made the occasion of inviting or giving an opportunity for the gathering of people of different tribes or sections of tribes between whom old animosities are likely to be aroused by the excitement which beer-drinking creates.

5.—*Host Responsible for Good Order.*—The host or giver of beer, whether chief, headman, kraal head, or other person, shall be held responsible for the good conduct and order of his guests and visitors, and such others as may partake of the beer.

6.—*Approval of Kraal Head Necessary.*—No inmate of a kraal may be the giver of beer, except with the approval of the kraal head, or in his absence, his representative, who will, on giving his approval, be so held responsible.

7.—*Sunday Prohibition.*—No public beer drinking party shall be held on a Sunday or public holiday.

8.—*Beer not to be Supplied to Intoxicated Person.*—Any person who supplies beer to a person already inebriated or excited from the effects of drinking beer at the same or other kraals on the same day, or who shall turn out or allow to depart from his kraal without a responsible companion or protection, any person who is under the influence of beer and unable to take care of himself, and should such person suffer injury in consequence thereof, shall be guilty of an offence.

9.—*Females Debarred.*—The attendance and participation in public beer-drinking parties (wedding parties alone excepted) of all females other than the hostess and of boys, "Abafana," is prohibited.

10.—*Guests must Leave at Sunset.*—All guests or visitors who attend a beer-drinking party must leave at sunset, and it shall be the duty of the kraal head, or, in his absence, his representative, to order them so to leave. Any person neglecting or refusing to leave when ordered to do so by such kraal head, etc., shall be guilty of an offence.

11.—*Allowing Females to Attend, an Offence.*—Any kraal head or other person who shall allow any female or females from any other kraal or kraals to attend at or participate in any beer-drinking party at his kraal shall be guilty of an offence.

12.—*Respect of Elders Enjoined.*—Young men who at a beer drinking party shall fail or neglect to recognise and to respect the superior position and rank of their elders, or the men present, shall be guilty of an offence.

Any young man who shall sit down to drink beer in the company of the men (*amadoda*) unless specially invited so to do by the principal man of the hut, with the approval of the other men present, shall be guilty of an offence.

13.—*Insulting Language an Offence.*—Any Native who shall in the course of a beer-drinking gathering make such insulting gestures or use such language as is calculated to or intended to provoke a breach of the peace shall be guilty of a contravention of these rules.

Any infringement of the provisions of this rule must be at once checked by the kraal head, and the offender or offenders reported to the nearest police station or office.

14.—*Chiefs must be Notified by Kraal Heads.*—Kraal heads shall notify to the chief, if residing in the same Division, or if not, then to the district headmen representing the chief, their intention to hold a public beer-drinking or other festive gathering where beer is given.

15.—*And by District Headmen.*—District headmen shall notify to their chief, if he resides within a reasonable distance, any such intention on their part, otherwise to the Magistrate.

16.—*Chiefs must Notify Magistrates.*—Chiefs shall give due notice to the Magistrate of any intention to hold such a gathering at their own kraals, when it is expected that there may be a large number of guests and visitors.

17.—*Notice does not Affect Responsibility.*—The notice to be given under these regulations by chiefs, district headmen, and kraal heads respectively shall in no sense be taken to reduce the responsibility attaching to the host or giver of the beer.

18.—*Consent of Owner on Private Lands Required.*—No public beer-drinking gathering shall be held on private lands occupied by a European landlord or tenant without his permission.

19.—*Definitions.*—“Kraal Head” denotes the head of a family, and the possessor of the kraal or kraals containing such family, either in his own right or by the right of guardianship. The term “kraal head” shall also include the heads of families living on mission stations or private lands, whether living in kraals or separate dwellings.

The word “kraal” denotes the domestic establishment and ordinary place of residence of Natives. It is subject to and under the control of a “kraal head,” and may consist of one or more houses.

For the purposes of these regulations individual dwellings occupied by Natives on Mission Stations, or private lands, or elsewhere, are to be deemed kraals.

The word “inmates,” when used in connection with a kraal, denotes the persons usually residing therein, and subject to the kraal head.

II.—LOANS TO NATIVES.

ACT No. 41, 1908.*“To Regulate Claims against Natives for Interest.”*

1.—*Application of Act.*—The provisions of this Act shall apply to any transaction which, whatever its form may be, is substantially one of money-lending.

The word “*interest*” as used in this Act (except in Section 3) includes any charges made in respect of a loan.

Advances of money by an employer to be repaid by the labour of the Native to whom advances are made shall not be deemed to be a loan under the provisions of this Act.

Any reference in this Act to a loan or the like means the money lent without any additions whatever.

2.—*Loans Irrecoverable unless Contract in Writing.*—No judgment shall be given in any Court of Law against a Native for the recovery of a loan made after the commencement of this Act, or for interest on such loan, unless the contract has been reduced to writing in manner provided by this Act.

3.—*Execution of P.N.'s, etc., by Natives.*—Section 8 of Law No. 41 of 1887 is hereby repealed, without prejudice to its operation in regard to documents executed before the commencement of this Act.

The following requirements shall be observed in the execution of every promissory note or other document of debt or any renewal thereof made by a Native:—

The net sum borrowed, the rate of interest, and any other charges, whether by way of commission or in any other manner, shall be separately stated, and the date of repayment shall also be specified in the body of the document;

Before the document is signed by the Native there shall be endorsed thereon a statement signed by the lender that the actual sum lent and the other particulars contained in the document are truly set forth;

The Native shall sign his name or make his mark in the presence of a Magistrate, or Justice of the Peace;

The Magistrate or Justice of the Peace shall sign a certificate upon the document that the Native signed his name or made his mark in such officer's presence after the same had been explained to him by the said Magistrate or Justice of the Peace. But a Magistrate or Justice of the Peace shall in no case attest a document in which the rate of interest, together with other charges, exceeds the rate of 15 per

cent. per annum: Provided, however, that the usual charges for preparing and registering any mortgage or notarial bond may be charged over and above interest at the said rate.

In the case of a bond or other document executed under a power of attorney, the requirements of this section shall be sufficiently complied with if they are observed in the execution of the power of attorney.

It shall be the duty of the Magistrate or Justice of the Peace in every case to satisfy himself that the document shows the real transaction between the parties. If he has reason to doubt that such is the case, or if the transaction is illegal, he shall not attest the document.

4.—*Interest Exceeding 15 per cent. not Recoverable.*—It shall not be competent for any Court of Law to adjudge a Native to pay interest in excess of 15 per cent. per annum upon any loan, but this section shall not apply to a loan made before the 1st September, 1908.

5.—*Illegality of Agreements Carrying Higher Interest than 15 per cent.*—If in any agreement made with a Native, whether before a Magistrate or Justice of the Peace or not, interest is agreed to be paid at a higher rate than 15 per cent. per annum on a loan, the agreement shall to that extent be illegal and void, notwithstanding the provisions of Law No. 6 of 1858, and any Native who shall have repaid the loan with interest in excess of the rate aforesaid, shall be entitled to sue for and recover whatever has been paid beyond the amount of the loan and interest at such rate as, after inquiring into the circumstances, the Court shall consider fair and reasonable; but no such suit shall be instituted more than two years after the payment has taken place, or in respect of any payment made before the promulgation of this Act.

6.—*Enquiries by Court.*—When any Native is sued for the recovery of a loan, or for the enforcement of an agreement or security in respect of a loan, it shall be the duty of the Court to make inquiries, and, if need be, to call any witnesses, in order to satisfy itself as to the actual amount of money lent, and the amount of interest or other charges in respect thereof.

7.—*Negotiation of Promissory Notes, etc.*—Every holder by assignment or otherwise of a promissory note or other document of debt executed by a Native shall be deemed to have taken the same, subject to the provisions of this Act, and without any other or greater rights against the Native than at the time when the document was executed belonged to the person in whose favour it was made.

8.—*Fraudulent Representations to Natives to be deemed Falsity.*—If any person shall, by any false or misleading representation or promise, or by any concealment of material facts, fraudulently induce any Native

to agree to the terms on which money is borrowed, or if the statement made by him as required by Section 3 is false in any material particular, or if the document of debt misrepresents the actual transaction between the parties, he shall be guilty of the crime of falsity, and shall not be entitled to recover the amount of money lent or interest thereon.

Any Native who knowingly makes a false statement to a Magistrate or Justice of the Peace regarding a document of debt to be attested by such Magistrate or Justice of the Peace under this Act, or regarding any matter connected with the loan referred to in such document, shall be guilty of the crime of falsity.

9.—*Rate of Interest on Sales.*—In any contract of sale to a Native no higher rate of interest shall be chargeable or recoverable than eight per cent. per annum on the purchase price or on the balance thereof which may at any time be outstanding.

10.—*Interest on Arrear Rents Illegal.*—It shall not be lawful for any landowner or lessor to charge any money by way of fine or interest in respect of the non-payment of any rent due by a Native to such landowner or lessor.

[Dated 13th Nov., 1908.]

REFERENCES IN OTHER LAWS.

NATIVES AND LIQUID DOCUMENTS OF DEBT.

Contracts of Natives founded on liquid documents of debt are dealt with in Section 8 of Law No. 41 of 1887 ("to amend 'The Native Administration Law, 1875'"); and as this Law is not included in the present Abstract, the section in question may usefully be quoted here. It reads as follows:—"That no judgment shall be given in any Court of Law against any Native founded on a promissory note, bill of exchange, or mortgage bond, or other liquid document of debt,* unless such promissory note, bill of exchange, mortgage bond, or other liquid document of debt, shall have endorsed thereon, or attached thereto, a certificate signed by a Resident Magistrate or a Justice of the Peace, to the effect that the Native sought to be charged thus signed his name or made his mark in the presence of a Resident Magistrate or of a Justice of the Peace after the same has been explained to him by the said Resident Magistrate or Justice of the Peace†: Provided that this clause shall not extend to any document signed before the passing of this Law."

*A certificate of sale and purchase of Crown Lands is not a "liquid document of debt" within the meaning of this Section. (*Surveyor-General v. Umhlagulu*, 14 N.L.R. 24.)

†If the explanation was made through an interpreter the certificate should state that it was done in the presence of the Magistrate or J.P. (*Francis v. Unojela*, 17 N.L.R. 9.)

Chapter XII.

STATE AID TO AGRICULTURE, AND LAND SETTLEMENT.

[LAWS. —Act 44, 1904 ; Act 27, 1907 ; Act 31, 1908 ; Act 27, 1907.]

Act No. 44 of 1904 is the leading Law providing for agricultural development. The salient features of this Act are the constitution of a Land Board; the purchase of lands by Government for the purposes of settlements, and the constitution of settlements; the formation of co-operative associations; and the provision of advances to settlers.

Under Act No. 23 of 1910 purchasers of Crown lands are enabled, on certain terms, to suspend payment of the instalments of the purchase price. Particulars of the conditions under which this may be done will be found set forth in Section 2 of the Act.

Act No. 27 of 1907 authorised the creation of a Land and Agricultural Loan Fund, for the assistance of persons engaged in agricultural and pastoral pursuits. This Fund is managed, under the Act, by a Board of Commissioners, who are empowered to make advances to farmers and landowners for the purposes of: (a) paying off existing liabilities; (b) effecting improvements, including water pumping and storing, irrigation, fencing, cleaning land for cultivation, planting of orchards, etc., farm buildings; and (c) for the purchase of live stock and plant. The security required is a first mortgage on the following classes of land not being within the limits of any borough or township, namely:—(a) Freehold land; (b) quit-rent land; (c) land held under agreement of purchase from the Crown; (d) land held under lease from the Crown; and (e) land held under private lease provided the landlord becomes a joint mortgagor. Except in certain cases the limit of advances that may be made is three-fifths of the value of the land as determined by the Board. The rate of interest is to be fixed by the Governor. There are two kinds of loans—one, for a limited period not exceeding five years; and the other (known as an instalment loan) for a period not exceeding 35 years—loans under this system are repayable by instalments.

Act 31 of 1908 imposes a cession fee upon cessions of unregistered Crown leases.

I.—AGRICULTURAL DEVELOPMENT (GENERAL).

ACT No. 44, 1904.

Short Title: "The Agricultural Development Act, 1904."*Part I.—Preliminary.*3.—*Interpretation of Terms.*—In this Act—

"*Reside*" means to have one's ordinary habitation on and to live upon the land not less than nine months in each year.

"*Improvements*" means fences, houses, farm buildings, roads, dams, reservoirs, wells, mills, wind-mills, permanent irrigation channels, water pipes, drains, dipping tanks, the improvement of pasture, planting of trees, increase of value effected by the application of approved manures, and any other works or things, which may include ploughing, tending to improve the agricultural or pastoral value of the land, which may by order of the Governor in Council be notified in the *Natal Government Gazette* as being added to the above list

"*Crown Lands*" means any unoccupied lands belonging to the Government of Natal, other than such as may be specially exempted from the operation of this Act by order of the Governor in Council.

"*Private Lands*" means lands not belonging to or occupied by His Majesty's Imperial or Colonial Government.

"*Rural Lands*" means lands outside the limits of a Borough or Statutory Township or of any Township or Village under any Law or Act relating to such, or of any village or any group of houses which in the opinion of the Minister is of an urban and not of a rural character.

"*Owner*" means the registered holder of land held under freehold or quit rent tenure, or the purchaser of Crown Lands to which title has not yet been given.

"*The Minister*" means the Minister having charge of the Department entrusted with the administration of this Act.

"*Proper Officer*" means the officer charged with the performance of a particular duty.

"*Settler*" includes a lessee of land under this Act, and his successors in title.

"*Holding*" includes a lease or allotment.

4.—*Application of Act.*—This Act shall apply only to rural lands.

SECTIONS 5—14 deal with the constitution of the Land Board.

SECTIONS 15—17 deal with regulations under the Act which the Governor is empowered to make.

18.—*Leases*.—All leases issued under this Act shall be in such form and shall contain such terms and conditions as may be prescribed by the regulations, including, in particular, reservations or servitudes regarding roads, railways, telegraphs, minerals, forests, water, and other matters of public utility.

19.—*Mortgages, etc.*—No settler, without the written permission of the Board, shall mortgage, charge, or otherwise encumber his holding, or any interest therein, and any attempted mortgage, charge, or encumbrance without such permission shall be null and void.

20.—*Security*.—All debts owed by a settler to Government in connection with this Act shall be a first charge upon his holding.

SECTIONS 21 and 22 deal with the powers of the Land Board.

23.—*Death of Settler*.—If a settler die, or be declared a lunatic, the conditions of his lease may be fulfilled by any member of his family, or by any other person approved by the proper officer. If no such person is forthcoming, the holding shall revert to the Crown, compensation being paid for the improvements, if any, to the representative of the settler.

24.—*Fences*.—The Fencing Law, 1887, shall be in force in every settlement made under this Act, but subject to any modifications which may be made by the regulations for the purpose of adapting it to the requirements of such settlements.

26.—*Age of Applicants*.—No person shall be allowed to select lands under this Act who shall not be at least twenty-one years of age, but lands may be selected on behalf of a person between the age of seventeen and twenty-one years, provided that provision is made for the proper occupation of lands on his behalf, and that security shall in such cases be required for the payments under any lease and for the fulfilment of its conditions.

27.—*Selection of Applicants*.—The regulations under this Act may prescribe any further or other conditions in regard to the selection of applicants or any requirements to be complied with by intending applicants, and may provide for the forfeiture of any rights by and for imposing liabilities upon persons who may make application or take up allotments in contravention or in fraud of the regulations or of this Act.

28.—*Area*.—No person already owning any rural land in Natal shall be allowed to acquire by lease or otherwise from the Crown any greater area of land than will, together with the land which he already owns, amount to the maximum area appointed by this Act for the classes of land so acquired. Grazing leases not being for a longer term than one year shall be excepted from this provision.

Part II.—Settlements on Private Lands.

29. If any available lands are considered suitable for settlement, the Minister shall submit a plan of the proposed settlement, together with an estimate of the cost, for approval by the Governor in Council.

30. Upon the approval of such plan by the Governor in Council, the Government shall have power to acquire the lands included therein by agreement with the owner.

31. The Board may, after any revision and final settlement of the plans of settlement, have the lands surveyed, sub-divided, and laid off in allotments, and may determine the values to be placed upon them and fix the rents to be charged.

32. The Board shall, as soon as the lands are ready to be thrown open, advertise them for selection, and shall receive and decide upon applications for allotments.

33. All lands to which this part of the Act applies shall be classed as under, and shall be divided into allotments as hereinafter provided for respective classes:—

First class: Lands suitable for special farming.

Second class: Lands suitable for mixed farming.

Third class: Lands suitable for pasture or tree planting.

34. Lands of the third class may be reserved for afforestation, or they may be surveyed into blocks not exceeding 2,000 acres each, to be let on pastoral residential leases on the following terms:—

The leases shall be for a term of thirty-three years, with the right to cultivate.

The lessee shall be required to make improvements to the value of three shillings per acre during the first six years, and to maintain the improvements throughout the term of the lease.

The leases shall be terminable summarily for non-payment of the rent or for the non-fulfilment of their conditions.

An allottee shall be entitled, on satisfying the Board that he has beneficially occupied the block held by him for a period of fifteen consecutive years, to a grant in freehold of the block so occupied, on such terms as to payment of purchase price as the Governor in Council may decide on the advice of the Land Board.*

35. At the expiry of the lease it may be renewed upon a revised rental, or the land may be resumed by the Government for tree-planting, or the land may be classed under the first class or second class, in which case the outgoing tenant shall have the right of selecting an allotment in the class in which the land has been ranked; in either case the outgoing tenant shall receive compensation for his improvements.

*This last clause was added by Act No. 8, 1927.

36. Lands of the second class shall be divided into agricultural allotments of from 250 to 500 acres, and shall be offered on lease for ninety-nine years, upon such terms and conditions as may be determined by the Governor in Council.

The allottees shall be required to reside on their allotments during nine months in each year, and to effect improvements in the first three years to the extent of five shillings per acre, and in the second three years to a further value of six shillings and eightpence per acre, and to maintain the improvements.

The lands shall be liable to be resumed by the Crown for non-payment of rent, or for the non-fulfilment of the conditions of occupation, and the lease of any land so resumed shall be sold by public auction, and the upset price shall be the amount due to the Government, with cost of proceedings added thereto; any balance above such amount shall be paid to the defaulting settler.

The allottee shall be entitled, on satisfying the Board that he has beneficially occupied the block held by him for a period of fifteen consecutive years, to a grant in freehold of the block so occupied, on such terms as to payment as the Governor in Council may decide on the advice of the Land Board.**

37. Lands of the first class may be divided into blocks for irrigation areas, small dairy, poultry, or bee farms, or the like, the cultivation of fruit, tobacco, fibre plants, essential oil plants, vegetables, or any other agricultural products of high market value.

38. The allotments shall be approximately upon the following scale:

Blocks intended for irrigation shall be divided into lots not to exceed 60 acres each, save where the quality of the soil renders some extension advisable.

Blocks not intended for irrigation shall be divided into lots not exceeding 250 acres.

Such lands may in the discretion of the Government be grouped round centres set apart for factory or township purposes.

39. Allotments of land of the first class shall be offered on lease upon terms as to rent and otherwise similar to those prescribed in respect to lands of the second class, save as is hereinafter specially provided.

In the case of lands planted and duly maintained as fruit farms, the Board may remit the rent for a period not exceeding three years.

40. The lessees shall in every case be required to reside on the land, and to make improvements to the value of ten shillings per acre in the first three years, and to the value of a further ten shillings in the next three years.

** This last was added by Act No. 28, 1907.

41. The Government may in their discretion reserve temporarily so much of the land round the factory or township centres as may in their opinion be requisite for grazing purposes, but this shall not be made to give to anyone rights of commonage, and the land may at any time be offered by the Government in allotments for settlement.

Part III.—Crown Lands.

42. Crown Lands coming within the category of first or second class lands may be dealt with as provided in the case of private lands under Part II. of this Act.

Part IV.—Provisions for Promoting the Success of Settlements.

43.—*Tramways.*—The Board may authorise the use of tramways upon any roads between settlements established under this Act and the neighbouring railway stations, towns, or ports.

44.—*Roads.*—The Board may, out of the funds placed at their disposal as hereinafter provided, make and maintain any local roads within a settlement, and may make, construct, and maintain, or authorise the use of, tramways upon any such roads.

45.—*Water Supply.*—The Board shall similarly have power to make water furrows and to take and lead water for the purpose of a settlement from any stream or river passing through or near it, and to regulate the flow and distribution thereof; and for that purpose they shall have the right to catch and collect water and to construct dams, weirs, and other works, at any part of such stream in or above the settlement, to enclose or fence in water or water works, and to convey water to and over any land in the settlement by furrows, pipes, or otherwise, with all such other powers as may be necessary for securing a sufficient supply of water.

46.—*Riparian Owners.*—Such powers shall not be exercised so as to deprive any person who is at the time of the formation of the settlement, or at the time of the commencement of any such works, a riparian owner of the water necessary for domestic use or for animal life, and, if the taking and using of any water shall injuriously affect any such riparian owner or any person who has up to the time of the taking of the water had a right to use the same, such person shall be entitled to compensation in terms of this Act.

47.—*Advances for Improvements.*—The Board may, upon the application of any settler within the first three years of his occupation of an allotment, advance him an amount not exceeding two-thirds of the assessed value of any improvements which may have been made by him on his land with the approval of the Board, and the amount of such advance

shall be a charge upon the land, and shall be repaid, with interest at four and a half per cent., by instalments to be added to the instalments otherwise payable by him.

48.—*Advances for Stock, etc.*—The Board may, upon the application of a settler during the first year of his occupation, advance him an amount, not exceeding Sixty Pounds Sterling, for the purchase of live stock, implements, seed, manure, or food: Such advance shall be a charge upon the land, and shall be repayable, with interest at four and a half per cent., in three equal annual instalments.

49.—*Fraud.*—If any settler to whom an advance shall have been made as aforesaid shall apply the moneys to purposes other than those for which they were supplied, he shall be guilty of the crime of fraud.

50.—*Rates.*—The Board shall have power, under regulations to be made as hereinbefore provided, to levy and get in such rates as may be necessary for the maintenance and repair of roads, tramways, furrows, or any other works carried out for the public benefit of the settlement and for all current charges and costs of the settlement.

51. Such regulations may also determine the basis and mode of valuation for the purposes of the rates, and may make such exemptions as may from time to time be considered proper in the public interest of lands held and used for public purposes, or for purposes of a church, public institute, school, or hospital, or for charitable institutions.

52.—The Board may also make such annual or special charges as may be fixed by the regulations for the supply and use of water for domestic, industrial, and irrigation purposes respectively.

53. The Board may also under such regulations fix and levy charges for the use of tramways and public conveyances other than roads.

55.—*Sites for Public Purposes.*—Suitable sites shall be set apart for schools and for public purposes of a settlement.

56.—*Factories.*—The Board may, with the approval of the Governor in Council, assist agriculturalists in the establishment of factories or the like for the purpose of the manufacture of dairy or farming produce, such as butter, cheese, and tobacco, or the packing or preserving of fruit, or any other factories for the purpose of the better utilisation or marketing of raw produce.

57.—*Co-operative Associations.*—No scheme for any such undertaking shall be approved unless it is to be established and carried on by an association in the nature of what is known as a co-operative association, or until the constitution and articles of such association have been submitted to the Board and approved by them.

58.—The regulations under this Act may prescribe the conditions:

necessary to be complied with before any association can receive the approval of the Board, whether in respect of its formation, membership or liabilities, the distribution of profits, or any other matters whatsoever relative to its constitution.

59. The assistance to be given by the Government shall be by way of a contribution towards the capital outlay, and such contributions shall be made upon such terms as to payment, repayment and otherwise as to the Board shall seem proper.

60.—The Governor in Council may at any time direct that the repayment of any part of such contribution shall be remitted.

61. All sums so contributed shall be a first charge preferred to all others whatsoever upon the lands leased to settlers who are members of the association, and also upon the factory and its buildings and machinery if situated upon land not belonging to the Crown.

62. The Governor may at any time, by proclamation, offer bonuses for the export of approved agricultural products. Such bonuses shall be paid from moneys provided for the purpose by Parliament.

Part V.—Loans and Advances.

[This Part empowers the Governor to borrow moneys not exceeding altogether One Million Sterling, and deals with financial matters generally in connection with this Act. The sections in this Part are not of sufficient general interest to warrant their reproduction here.]

[Dated 19th Aug., 1904.]

ACT No. 23, 1910.

“To enable Purchasers of Crown Lands to Suspend Payment of the Instalments of the Purchase Price upon Suitable Terms.”

1.—*Interpretation.*—The words “purchaser of Crown lands” and any like expression used in this Act means the lawful holder, under certificate of sale or cession thereof, or lands sold by the Government under the system of deferred title and payment of the price by annual instalments. References to purchase or sale include an allotment or other disposal of Crown lands under the said system.

2.—*Suspension of Instalments.*—The Surveyor-General shall, at any time after the payment of the first instalment, upon written application being made to him by a purchaser of Crown lands, grant to such applicant permission to suspend payment of the annual instalments of the purchase price, subject to the following exceptions and conditions:—

- (a) Application must be made before an instalment shall have been in arrear for three months, otherwise the Surveyor-General may, if he thinks proper, refuse to allow the suspension.

- Ab) No such permission shall be granted unless the purchaser satisfies the Surveyor-General that he has fulfilled the requirements of his certificate of sale in regard to residence and occupation of the land.
- (c) A purchaser shall not be entitled as of right to obtain such permission after proceedings at Law have been commenced for enforcing any of the conditions of sale.
- (d) Every instalment so suspended shall carry interest at the rate of five per cent. per annum from the day on which it became due, and the interest shall be payable to the Surveyor-General yearly or half-yearly, as may be stated in the permission.
- (e) Upon any failure to pay interest the permission to suspend payments may be revoked, and thereupon the conditions of the certificate of sale in regard to the failure to pay instalments shall at once become enforceable as if no such permission had been given.
- (f) In no case shall the granting of permission to suspend instalments relieve the purchaser of any of the other obligations imposed by the certificate of sale, nor shall he have any claim to receive registered title to his land until he has paid all instalments and interest and has in every respect carried out the requirements of the certificate of sale.

Should the Government remit the condition of occupation for any period, the purchaser must, before receiving title, make up a further period of such occupation equal to that which has been remitted.

3.—*Existing Agreements for Suspension.*—Any arrangements made with the purchaser of Crown lands before the passing of this Act, under which he has been allowed to suspend payment of instalments, shall continue in the same way and subject to the like conditions as if the permission had been given under this Act.

4.—*Interest on Arrears prior to Suspension.*—If a purchaser of Crown Lands allows any instalments to be in arrear and unpaid for more than three months without having obtained permission for the suspension of payment, every such instalment shall carry interest at the rate of six per cent. per annum from the date of such instalment up to the time when permission to suspend payment is granted, and such interest shall be payable to the Surveyor-General at the end of every six months, beginning from the date of the instalment.

5.—*Compliance with Conditions of Sale.*—No purchaser shall be entitled to tender payment of any instalment or interest unless he produces the proper proof of compliance with the conditions of sale, nor shall he

be in any way relieved from any obligation or liability under the conditions of sale if payment should in any case be accepted while such conditions remain unsatisfied. In any case in which occupation must be such as constitutes a reasonably sufficient utilisation of the land, having regard to its extent and character, as well as to its situation and any natural circumstances affecting its use. In the case of land held by a European, occupation by Indians or Natives shall not be deemed to be occupation within the meaning of the certificate of sale.

II.—LOAN FUND.

ACT No. 27, 1907.

“To authorise the Government to Assist Persons Engaged in Agricultural and Pastoral Pursuits by Loans, and to Appoint a Board for the Management and Administration of a Fund created for that Purpose.”

Short Title: “The Land and Agricultural Loan Fund Act, 1907.”

1.—*Interpretation of Terms.*—In this Act, unless inconsistent with the context:

“*Board*” shall mean the Board of Commissioners appointed under this Act.

“*Commissioner*” shall mean every Commissioner appointed under this Act.

“*Governor*” shall mean the Governor with the advice of the Executive Council.

“*Manager*” shall mean Manager of Loans appointed under this Act, or any person lawfully acting in such capacity.

“*Immovable property*” shall mean all property regarded as such by law.

“*Treasurer*” shall mean the Treasurer of the Colony, or the person who is for the time being acting as such.

“*Regulations*” shall mean any regulation made by the Governor in accordance with this Act.

“*Prescribed*” means as prescribed by the regulations.

“*The Fund*” shall mean the Land and Agricultural Loan Fund created under this Act.

2.—*Establishment of a Land and Agricultural Loan Fund.*—There shall be established in this Colony a Land and Agricultural Loan Fund, administered and managed as hereinafter provided for promoting the occupation, cultivation, and improvement of the agricultural and pastoral lands of the Colony, subject to the provisions of this Act.

14.—*Advances: To Whom and for What.*—Advances may be made by the Board to farmers and landowners for all or any of the following purposes:—

- (a) To pay off existing liabilities.
- (b) To effect improvements, including:
 - 1. Water pumping, storing, irrigation.
 - 2. Fencing.
 - 3. For clearing land for cultivation.
 - 4. Planting of orchards and such like.
 - 5. Farm buildings.
- (c) For purchase of live stock and plant.

Provided, however, that no advances shall be made to any person who is a member of the Legislative Council, or Legislative Assembly, or Civil Service.

15.—*Security.*—The Board shall make advances only on the security of a first mortgage on the following classes of land not being within the limits of any Borough or Township:—

- (a) Freehold land.
- (b) Quit rent land.
- (c) Land held under agreement of purchase from the Crown.
- (d) Land held under lease from the Crown.
- (e) Land held under private lease provided the landlord becomes a joint mortgagor.

16.—*Limit of Advances.*—Except in so far as hereinafter provided the amount advanced shall in no case exceed three-fifths of the value of the land as determined upon by the Board, and for the purpose of arriving at such value, the Board may in its discretion add the value of any immovable property already on the said land or intended to be erected thereon with the proceeds of the loan applied for: Provided that in any case where the borrower is already indebted to the Government the amount to be advanced by the Board shall not, when added to the said existing debt, exceed three-fifths of the value aforesaid.

17.—*Crown Land Partially Paid For.*—Where the advance is made upon the security of Crown lands partially paid for, such advance shall not exceed three-fifths of the amount of the purchase price already paid on account of such land, but the Board may in its discretion add the value of any immovable property already on the said land: Provided always that in the event of the agreement of purchase being at any time thereafter cancelled, and the land resumed by the Crown, the latter shall, in default of recovery from the mortgagor, repay to the fund the amount of the advance, together with such interest as may be due thereon.

18.—*Leasehold Lands*.—No advance upon the security of leasehold land held under the Crown or under private lease shall be granted for an amount exceeding three-fifths of the value of the lessee's interest in the lease, as assessed on behalf of and to the satisfaction of the Board: Provided that in assessing the value of a lessee's interest under a lease held from the Crown, it shall be in the discretion of the Board to take into account the value of permanent improvements or of such standing or recurring crops as will last beyond the period for which the loan is made. Provided always that in the event of the agreement of lease being at any time thereafter cancelled and the land resumed by the Crown, the latter shall, in default of recovery from the mortgagor, repay to the Fund the amount of the advance, together with such interest as may be due thereon.*

19. No advance on the security of leasehold lands shall be granted unless and until all covenants and conditions on the lessee's part, contained or implied in the lease, are complied with up to the date of the application for the advance.

20.—*Limitation of Amount*.—No loan shall be granted by the Board to any person for a less amount than Fifty Pounds (£50) or for a larger amount than One Thousand Five Hundred Pounds (£1,500), nor shall any person who is already indebted to the Fund in the sum of One Thousand Five Hundred Pounds (£1,500) be capable of receiving any further advance.

21.—*Priority of Applications*.—All applications for advances of Five Hundred Pounds (£500) or under shall have precedence over those for a larger amount.

22.—*Interest*.—The Governor may by regulation fix the rate of interest chargeable in respect of such sum or sums as may be advanced from the fund, and the rate so fixed shall be such as shall cover the interest on the fund, expenses of administration and to provide for a reserve fund.

Interest on all loans shall be payable on the 30th day of June and the 31st day of December in each year.

23.—*Kind of Loans*.—The Board may advance money—

- (a) By way of a loan for a limited period not exceeding five years, repayable at the end of the period of such loan: Provided that the mortgagor may at the due date of the half-yearly interest repay any sum not being less than Five Pounds or a multiple thereof in reduction of the principal sum.

*Section as amended by Act No. 27, 1908.

- (b) By way of a loan (hereinafter described as an instalment loan) for a period not exceeding thirty-five years, repayable by instalments during such period.

Applications for loans shall be made in the form and subject to the conditions prescribed.

21.—*Instalment Loan*.—Advances on instalment loans shall be subject to the following provisions:—

- (1) The loan with interest thereon shall be by half-yearly instalments payable on the 30th day of June and the 31st day of December in each year, such repayments not to exceed seventy in all.
- (2) The Board may in the case of loans for improvements agree, subject always to the half-yearly payment of interest, that the payment of instalments on account of the principal, shall not begin until the expiration of a period not exceeding three years from the date of the loan.
- (3) All such half-yearly instalments shall be calculated and paid according to a schedule attached to the mortgage bond, setting forth all such instalments, and showing to what extent each instalment is on account of the principal, and to what extent on account of interest, and also the balance due on the due date of each instalment.
- (4) Irrespective of the prescribed half-yearly instalments, the mortgagor shall be given the right from time to time or at any time to pay any sum not being less than Five Pounds or any multiple thereof in reduction of the mortgage debt: Provided that no such payment shall affect the prescribed half-yearly instalments or the obligations of the mortgagor in respect thereto, but the same shall be held and applied as hereinafter provided.
- (5) All such last-mentioned payments or multiple thereof shall be credited with simple interest at the rate payable on the loan, until such payments, together with the accumulations of interest thereon, are equal to the balance of the principal owing for the time being according to the said table, together with all other monies, if any, owing under the mortgage and thereupon. Such payments shall be set off against such principal and other monies, and the mortgagor shall be entitled to the discharge of the mortgage on payment of the prescribed fees.

25.—*Form of Mortgage.*—The general form of mortgage for securing loans shall be as prescribed, subject to such modifications and conditions as the Board may think fit and proper.

26.—*Right of Foreclosure.*—All mortgages shall be subject to the special condition, subject to such modifications as the Board may think fit and proper, that whenever a mortgagor shall make any default in the due and punctual payment of any monies due under the mortgage or in the carrying out of any of the conditions to be fulfilled and observed by him, it shall be lawful for the Board to call up and compel payment of all the principal, interest and other monies for the time being owing by such mortgagor, notwithstanding that the time or times appointed for the payment of the monies secured under the mortgage may not have arrived.

27.—*Security to be in Favour of the Board.*—All mortgage bonds securing advances shall be in the name of the Board, and shall be deposited in the Treasury upon payment by the Treasurer of the amount secured thereunder.

28.—*Security to be Completed before Advance is Made.*—No advance shall be made:

- (a) Until the Board shall have been satisfied with the title of the applicant and the mortgage bond securing the advance shall have been registered.
- (b) Until the manager shall have certified in writing to the Board that all the requirements of this Act have been complied with and that the applicant is entitled to the immediate receipt of the advance.

Provided that where an application is made for a loan for the purpose of paying off an existing bond an advance may be made of the amount due under such bond upon a cession of the bond to the Board pending the registration of a new bond in favour of the Board.*

29.—*Cost of Mortgage.*—Every mortgage bond shall be prepared and at the discharge thereof duly cancelled by the Board, subject to the payment of such fees as may be prescribed. All such mortgage bonds shall be signed by the Manager, and the said bond shall be accepted by the Registrar of Deeds in the same manner as if it had been prepared by a duly qualified conveyancer.

30.—*Person having a Pecuniary Interest not in any way to act.*—Any person who—

- (a) Having any pecuniary interest in any land tendered as security for a loan under this Act, or
- (b) Being a partner of the applicant for a loan, or
- (c) Being in any way interested in any loan,

*This proviso was added by Act No. 24, 1909.

acts as Inspector or valuer in connection with such land or loan, or sits at any meeting of the Board shall be liable to a penalty of not less than Fifty Pounds (£50) or more than Two Hundred Pounds (£200), and shall also be dismissed from office.

38.—*Relation of Insolvency Law.*—The law for the time being in force in this Colony relating to insolvency shall, in so far as the discharge of the insolvent is concerned, not apply to debts due under this Act, except in cases where the Board shall certify in writing its consent to the discharge of an insolvent from all debts due under this Act.

[Dated 18th Oct., 1907.]

III.—MISCELLANEOUS.

ACT No. 31, 1908.

“To impose a Cession Fee upon Cessions of Unregistered Crown Leases.”

1.—In the event of any cession of lands held under lease from the Crown, whether by the original lessee or by any subsequent holder, there shall, notwithstanding anything contained in the lease, be paid to the Government a fee at the rate of three per cent. upon such amount of the purchase price or other consideration to be paid or given on account of such cession as would not be exempted by the provisions of Law No. 20, 1865, from the payment of transfer duty.

The word “*cession*” as used in this Act includes transfer or assignment.

This Act shall not apply to a registered lease upon the cession of which transfer duties may be payable under Law No. 19, 1884.

Chapter XIII.**IRRIGATION LAWS.**

[LAWS.—Law 26, 1887; Law 26, 1891.]

The former of the two Laws above noted empowers the Governor in Council to declare certain streams to be streams from which water may be conducted, and the area over which water may be conducted (which may include land not the property of the person or persons so carrying it). The second Law provides for advances for the purposes of constructing irrigation works. It also prescribes that when water is taken out of any river or stream for irrigation, the works are, as far as possible, to be so constructed as to return to the stream such water as is not necessarily consumed in irrigation.

LAW No. 26, 1887.

“To enable Individuals and Companies to Lead Water for Purposes of Irrigation through Lands not their own.”

[Abstract.*]

Short Title: “The Irrigation Law of 1886.”

2.—Land Clauses Consolidation Law, 1872, incorporated with this Law.

3.—Governor in Council may declare certain streams to be streams from which water may be conducted, and area over which water may be conducted. Owners may memorialise against declaration.

4.—Memorial to be reported on by Surveyor-General. If no valid objection Governor may declare streams available by notice in *Gazette*.

5.—Governor may grant leave for water to be carried from any declared streams over land not the property of those so carrying it.

6.—Application for permission, with plan of land to be traversed, and of works, to be sent to Surveyor-General, and copies to owners of land three months in advance. Twenty-eight day's notice to be given.

7.—If no objection lodged, Governor may declare applicant entitled to lead water and enter on the land.

*The length of the clauses in this Law and the one following oblige their condensation, which, however, will, it is thought, be sufficiently comprehensive for general purposes.

10.—Leader of water to have leave, upon notice, to enter on land for repairs to watercourse, and to take materials therefor from the land. Compensation for damage.

15.—Compensation for deprivation of water or water-right by conveyance under authority of this Law.

16.—Penalty of £10, or imprisonment for three months, for fraudulent diversion of water from authorised stream.

17.—Similar penalty for obstruction of person authorised to inspect and report, and for breaking down watercourse or embankment, or hindering flow of water, or causing it to escape.

18. "Any person or company availing himself or themselves of powers to construct a watercourse under this Law, shall, when required by the Resident Magistrate, by order, to do so, make and at all times maintain the following works, that is to say.—

"(a) Such and so many culverts or other means of communication as may be wanted over the watercourse, for the purpose of making good any interruptions, caused by the watercourse, over the land on which it is constructed.

"(b) Also sufficient fences for protecting against injury, person, persons, or stock passing by any places dangerous to their safety from depth of watercourse, or other causes resulting therefrom, and which would not be dangerous had the watercourse not been constructed."

[Dated 2nd March, 1887.]

LAW No. 26, 1891.

"To Promote Irrigation."

1.—*Interpretation of Terms.*—"In the construction of this Law—

"*Owner*" means that the registered owner of land, or the purchaser under a certificate of sale of Crown Lands purchased under any rules for the time being regulating the sale of Crown Lands, not less than three-fourths of the purchase price whereof shall have been paid, and includes any person, or partnership, or company.

"*Person*" also includes a partnership or company.

"*Works*" means the works of irrigation and artificial storage of water as specified in Section 3, in respect of which application is made for an advance under the provisions of this Law."

2. "This Law shall not operate with respect to any land situated within the boundaries of any Township or Municipality."

3.—Application may be made by landowner for an advance for purpose of irrigation.

4.—Written consent of mortgagees or lessees required.

5.—*Conditions upon which Advances may be made* [Full Text].—
The conditions upon which advances may be made shall be as follows, that is to say:—

- (a) No advance shall exceed two-thirds of the estimated cost, as reported by the Colonial Engineer, of the works for the purposes of which such loan is applied for, nor two-thirds of the value of the land, if improved, or one-half of the value of the land, if unimproved, such value being computed at the rate per acre at which the upset price of Crown Lands in the locality is fixed. In the case of land purchased from Government, of which the freehold title shall not at the time of the construction of the works have been granted, no advance shall exceed one-half of the paid instalments calculated at the upset price, nor be made in any case in which less than three-quarters of the purchase price shall have been paid, nor if any instalments of purchase price shall be in arrear.
- (b) When the total amount of the advance has been determined, it shall be lawful for the Government to cause to be issued one-half of such advance before the work has been commenced.
- (c) It shall be lawful for the Colonial Treasurer from time to time, upon production to him of the provisional certificate before mentioned, having endorsed thereon a certificate by the Colonial Engineer, that the applicant has satisfactorily expended the first half of the advance on the work, to pay such amounts on account of the advance authorised, as represents the same proportion of the whole advance as the cost of the works executed bears to the whole estimated cost: Provided, however, that:
 - (1) Until the completion of the works such payments shall not in the whole exceed three-quarters of advance authorised.
 - (2) Such payments shall not be made more than once in every calendar month.

Any balance remaining unpaid at the time of the completion of the works shall be payable by the Colonial Treasurer upon the production to him of the provisional certificate aforesaid, having endorsed thereon a certificate by the Colonial Engineer that the works have been completed to his satisfaction.

9.—*Terms of Repayment [Full Text].*—Every advance made under the provisions of this Law shall be repayable in fifteen equal yearly instalments, the first instalment being due and payable at the end of one year after the date of the final payment on account of the advance, and shall bear interest at the rate of five per cent. per annum. Such instalments to be so calculated and fixed that the capital sum advanced and the interest thereon shall be paid off in the aforesaid period of fifteen years, as more particularly shown in Schedule A hereunto annexed: Provided that it shall be lawful for the person liable to pay such advance in instalments as aforesaid to pay in one sum the value at the time of payment of all the instalments then remaining unpaid as shown in Schedule B hereunto annexed. All such instalments of capital and interest shall be paid to the Colonial Engineer. For the purposes of this section, and the following sections, the advance shall be deemed to include, in addition to the amount lent, or to be lent to the owner as aforesaid, the whole of the costs incurred by the Colonial Government in the course of any inspections, enquiries, and other proceedings taken under the provisions of Section 5 of this Law, and the cost of such engineering supervision or inspection as the Colonial Engineer may consider necessary during the execution of the work. All such costs and expenses shall be deducted from the amounts payable to the owner under the provisions of Section 8 of this Law.

10.—Moneys due to Government to be a first charge on estate of borrower.

14.—*Return of Water to Stream whence taken [Full Text].*—Whenever by any works to be constructed under the provisions of this Law water is required to be taken out of a river or stream, such works shall be so constructed as to provide, as far as circumstances will permit, for the return of all water not necessarily consumed in irrigation to the river or stream from which it was taken. Nothing in this section contained shall be deemed to give any person any other or greater rights in respect of the taking of water than he would otherwise enjoy.

15.—Damage to land by construction or otherwise, brought within Law 16, 1872, Section 65.

[Dated 3rd Sept., 1891.]

Schedule A.

Table of equal Instalments payable at the end of each year for fifteen years, corresponding to amounts payable under Section No. 9 of this Law.

Amount payable.	£ s. d.		Equivalent instalments payable at the end of each year for 15 years..
	£ s. d.		£ s. d.
1	0 1 11	80	7 14 2
2	0 3 10	90	8 13 5
3	0 5 9	100	9 12 8
4	0 7 8	200	19 5 4
5	0 9 8	300	28 18 1
6	0 11 7	400	38 10 9
7	0 13 6	500	48 3 5
8	0 15 5	600	57 16 1
9	0 17 4	700	67 8 10
10	0 19 3	800	77 1 6
20	1 18 6	900	86 14 2
30	2 17 10	1,000	96 6 10
40	3 17 1	2,000	192 13 8
50	4 16 4	3,000	289 0 6
60	5 15 7	4,000	385 7 5
70	6 14 11	5,000	481 14 3

NOTE.—Yearly instalments for any sum not mentioned in the above table, such as £2,128, may be obtained thus:—

£		£ s. d.
2,000 gives	.. ..	192 13 8
100 „	.. ..	9 12 8
20 „	.. ..	1 18 6
8 „	.. ..	0 15 5
Therefore £2,128 „	.. ..	£205 0 3

Schedule B.

Aggregate value of unpaid Instalments, each £100 in amount, of which the first is payable at once, and subsequently at yearly intervals.

Number of Instalments of £100 each.	£ s. d.		Aggregate Value.
	£ s. d.		£ s. d.
1	100 0 0	8	678 12 9
2	195 4 9	9	746 6 5
3	285 18 9	10	810 15 8
4	372 6 6	11	872 3 6
5	454 11 11	12	930 12 10
6	532 18 11	13	986 6 6
7	607 11 5	14	1,039 7 2

Chapter XIV.

MISCELLANEOUS.

[LAWS.—*Agricultural Societies* : Law 22, 1883. *Land for Public Purposes* : Law 2, 1880 ; Law 3, 1880 ; Act 10, 1899 ; Act 23, 1906. *Injuries to Animals on Railways* : Law 21, 1891.]

The registration of agricultural societies is provided for by Law No. 22 of 1883.

Act No. 23, 1906, provides for the compulsory acquisition of land, either by purchase or by exchange, for certain public purposes (a list of which will be found in the Schedule to the Act). Land for railways can be acquired under Act No. 10 of 1899; and provision is also made for the taking of water for the use of the railway. Compensation is provided for in certain cases. Compensation is also provided for under Law No. 2 of 1880 in certain cases of injury sustained by railway construction, *viz.*, in the case of damage to improved and bush lands. Law No. 3 of 1880 makes provision for the making of surveys for the extension of railways.

The liability of railway companies and other common carriers in respect of the loss of, or injury to, horses, cattle, and other animals delivered to them by carriage, is regulated by Law No. 21 of 1891.

1.—AGRICULTURAL SOCIETIES.

LAW NO. 22, 1883.

“To provide for the Registration of Agricultural Societies.”

1.—*Definition of “Agricultural Society.”*—Whenever the words “*Agricultural Society*” are used in this Law they shall be held to mean any society or association having for its object the advancement of the agricultural or horticultural industries of the Colony.

2.—*Registration of Society.*—It shall be lawful for the members of any Agricultural Society to register such society under the provisions of this Law.

3.—*Mode of Registration.*—If the members of any Agricultural Society desire to register under this Law, they shall forward to the Registrar of Deeds a copy of the rules of their society, together with a certified copy of the resolution authorising the registration passed at any meeting of members duly convened, and the Registrar of Deeds shall, on

the payment of a fee of Ten Shillings and Sixpence Sterling, give to the secretary, chairman, or other authorised officer of such society, a certificate setting forth the facts of such registration.

4.—*Appointment of Trustees.*—Every society prior to registration shall, at a meeting convened for the purpose, nominate and appoint one or more person or persons as trustee or trustees, hereinafter called the trustees, and a copy of the resolution making such appointment shall be forwarded to the Registrar of Deeds to be filed with the copy of the rules in his office.

5.—*Immovable Property of Society to be Vested in Trustees.*—All immovable property belonging to any society registered under this Law shall be vested in such trustees or their successors for the time being, for the use and benefit of such society and the members thereof; and in all actions or suits or indictments in any Court the same shall be stated to be the property of the trustee without any further description.

6.—*Trustees to Bring or Defend any Action Concerning Immovable Property of Society.*—The trustees are hereby authorised to bring or defend any cause, suit, action, or prosecution in any Court, touching or concerning the right or claim to immovable property of any society of which they are trustees, and may sue and be sued in their proper names as trustees without further description: And in the event of the death or resignation of trustees, or of their removal from office, any action or suit may be proceeded with by or against their successors in office as though no such death, resignation, or removal from office had taken place.

7.—*Liability of Trustees.*—The trustees shall not be liable to make good any deficiency which may arise or happen in the funds of the society, unless such deficiency shall arise from their wrongful act, neglect, or default.

8.—*Amendments in Rules of Society may be Registered.*—It shall be competent for any society registered under this Law to register any alterations and amendments in its rules in the office of the Registrar of Deeds on payment of a fee of 5s. for each and every such registration.

9.—*Trustee Provisions of this Law not to apply to Society whose Incorporation Law does not Require Trustees.*—Clauses 4, 5, and 6 of this Law shall not apply to any incorporated society if the Law incorporating such society shall not require the appointment of trustees.

[Dated 12th Nov., 1883.]

II.—ACQUIREMENT OF LAND FOR PUBLIC PURPOSES.

ACT No. 23, 1906.

*"To enable the Government to Acquire Land for Certain Public Purposes."**

1.—*Compulsory Acquisition of Land.*—Whenever the Governor in Council shall by resolution declare that any land is required for a public purpose mentioned in the Schedule of this Act, the Governor shall thereupon be empowered, subject to the exceptions and conditions hereinafter contained, to purchase and take such land, or to acquire it by exchange or otherwise.

2.—*Incorporation of Lands Clauses Law.*—The Lands Clauses Consolidation Law, 1872, except as is otherwise provided, shall be incorporated with this Act.

3.—*Exempted Lands.*—The following shall be excepted from the operation of this Act:—

- (a) All lands belonging to His Majesty the King.
- (b) Streets, market places, and the like public places of any town or village.
- (c) Lands apportioned and used for churches and other religious purposes; lands used for schools, hospitals, cemeteries, and charitable and benevolent institutions, with as much adjacent land as is actually used in connection with any such church or other purpose as aforesaid.
- (d) Lands occupied by the buildings, works, and underakings of any Town Council, Local Board, Village Board, or other public authority; parks, libraries, show grounds, and all other lands belonging or leased to trustees for public purposes, and actually employed in the purposes of such trust.

The above exceptions shall not extend to lands which, though belonging to any public body or trustees are unused, or let to hire, or used otherwise than directly for the works, undertakings, or other objects of such body or institution.

In the event of the Town Council of any Borough or the Local Board of any Township having by vote reserved any particular piece or pieces of land in such Borough or Township respectively for any specific public purpose or purposes, such land shall not be purchased or acquired under the provisions of this Act by virtue of any resolution of the Governor in Council passed subsequently to such vote.

*See also Act No. 15, 1896, on the acquisition of lands for outapan places, (Ch. VI. iv).

4.—*Deposit under Land Clauses Law*.—Nothing in the Lands Clauses Consolidation Law, 1872, shall be deemed to require a deposit to be made by the Government with the Master of the Supreme Court in respect of the land taken or acquired under this Act.

5.—*Evidence of Resolution of Governor in Council*.—In any proceedings relating to land taken or acquired for public purposes under this Act, an extract from the records of the Executive Council, certified by the Clerk to the Executive Council, containing a resolution relative to the purchase, taking, or acquisition of the land, shall be conclusive evidence of the fact of such resolution.

[Dated 31st July, 1906.]

Schedule.

Schools, hospitals, post or telegraph offices, police stations, court houses, gaols, public offices, armouries, magazines, quarters, barracks, laagers, rifle ranges, and generally any buildings which may be needed for the use of any department of the public service, together with such land as the Governor in Council may deem to be reasonably proper to be attached to any of the above-mentioned buildings, having regard to their purpose.

Act No. 10, 1899.

“To Empower the Governor to Acquire Land for open Railways, and to take and lead Water Required for Railway Purposes.”

3.—*Compensation*.—In arriving at the price or compensation to be paid in respect of the taking of land under this Act there shall be taken into account—

- (a) The damage to be caused by the severance of the lands of the owner, or by any other cause injuriously affecting the same and arising out of the exercise of the powers given by this Act;
- (b) The benefit and advantage to be derived by the owner from the works proposed to be carried out on such lands.

4.—*Re Land Clauses Consolidation Law*.—None of the provisions of the Lands Clauses Consolidation Law, 1872, requiring a deposit to be lodged with the Master of the Supreme Court, shall apply to the acquisition of land required for any line of railway now or hereafter to be constructed by the Colonial Government or worked by the Natal Government Railways.

5.—*Right to Use Water*.—The provisions of this Act shall likewise apply to the acquisition of the right to take or use any water required for the purposes of any railway constructed by the Colonial Government.

or worked by the Natal Government Railways, and to the right to catch and collect water, to construct dams, weirs, and other works, to sink wells of shafts, to enclose and fence any water or waterworks, to lead and convey water over and through any land in furrows, or by pipes or otherwise, and generally for all necessary purposes for securing a sufficient supply of water. The provisions of this clause shall not apply to Municipalities constituted under Law No. 19, 1872, or to Townships constituted under Law No. 11, 1881, and any Laws or Acts amending the same.

6.—*Compensation.*—If the taking of water, by virtue of the powers conferred by this Act, shall injuriously affect any person through whose land the water passes, or who has, up to the time of the taking of the water, had the right to use the same, such person shall be entitled to compensation in terms of this Act.

[Dated 12th July, 1899.]

LAW No. 2, 1880.

“To Provide for the Compensation in Certain Cases of Injury Sustained by Railway Construction.”

2.—*Damage to Improved and Bush Lands.*—In all cases where claims for compensation have been or may be preferred by reason of damage caused by railway construction, by reason of any severance of lands improved by cultivation, irrigation, or otherwise, or by reason of damage done by the destruction of bush which may have saleable value, the compensation so claimed as aforesaid shall be ascertained and determined in the same way as are claims for compensation now made, preferred, and adjudicated upon under the provisions of Law No. 19 of 1875,* entitled Law “to provide for the construction and maintenance of the main roads of the Colony.”

LAW No. 3, 1880.

“To make Provision for the Making of Surveys for the Extension of Railways.”

4.—*Right of Entry upon Lands.*—Any Surveyor or other person who shall be so appointed under the provisions of this Law may, upon giving not less than twenty-four hours' notice to the registered proprietor, if resident within the Colony, or the occupier, enter upon any lands upon which he may deem it necessary to enter for the purposes of surveying and taking levels, and of probing or boring to ascertain the nature of the soil, and to do all acts necessary for the purpose of setting out the line of the works: Provided that any such notice shall not hold good for

*The text of this law will be found in Ch. VI., I.

more than one month; and provided that compensation be made to the owner or occupier thereof for any damage thereby occasioned, the amount of such compensation to be decided by the Resident Magistrate of the County or Division, whose decision shall be final, due notice of the Magistrate's enquiry into the claim to be previously given to the Surveyor by the complainant; and upon the day fixed in such notice the Magistrate may determine and decide upon the amount of compensation to be paid in respect of any such damage, and may award the amount of costs incidental to such inquiry, and determine by whom such costs shall be paid. Such compensation, and the costs, if any such should be so awarded against the Colonial Government, shall be a charge upon and be defrayed out of the general revenue of the Colony.

III.—INJURIES TO ANIMALS ON RAILWAYS.

LAW No. 21, 1891.

"To Regulate the Liability of Railway Companies and other Common Carriers in respect of the Loss of, or Injury to, Horses, Cattle, and other Animals Delivered to them for Carriage."

1.—*Interpretation of Terms.*—In this Law—

"Carrier" shall include the Natal Government Railways, or any other Railway Company and other common carriers.

"Cattle" shall include bull, cow, ox, heifer, and calf.

2.—*Limitation of Carrier's Ordinary Liability.*—No carrier to whom any of the animals hereinafter mentioned shall be delivered for carriage shall be liable by reason of the loss of, or injury done to, any such animals beyond the sums hereinafter mentioned, that is to say:—

For any horse—Fifteen Pounds,

For any cattle—Seven Pounds per head,

For any ass or mule—Ten Pounds,

For any sheep, goat, pig, or dog—Twelve Shillings and Sixpence, Unless the person sending or delivering the same to such carrier shall, at the time of such delivery, have in writing declared them to be respectively of higher value than as above mentioned, and such increased charge as is hereinafter mentioned shall, in addition to the ordinary rate of charge, have been paid, or have been agreed to be paid to, and such engagement to pay shall have been accepted by, the carrier.

3.—*Increased Charge when Value of Animal Declared.*—When any animal shall be delivered to a carrier for carriage, and the value shall be declared as aforesaid, and shall exceed the sum mentioned in the preceding section in respect of each animal, it shall be lawful for the carrier

to demand, and receive, an increased charge as compensation for the greater risk and care thereby occasioned. Such increased rate of charge shall be notified by some notice affixed in legible characters in some conspicuous part of the office, warehouse, or other receiving place where such animals as aforesaid are received by the carrier for the purpose of conveyance, stating the increased rates of charge required to be paid over and above the ordinary rate of carriage as a compensation for the greater risk and care to be taken for the safe conveyance of such animals, and all persons sending any such animals shall be bound by such notice without proof that the same shall have come to their knowledge: Provided always, however, that the liability of a carrier shall in no case exceed the amounts following, that is to say:—

	£
Horses and Mares	250
Bulls	150
Cows	50
Rams	100
Ewes	50
Goats	50
Jackasses, imported	100

4.—*Receipt for Animal Received at Special Rate.*—When the value shall have been so declared, and the increased rate of charge paid, or an engagement to pay the same shall have been accepted, the carrier shall, if thereto required, sign a receipt for the animal acknowledging the same to have been so received; and if such receipt shall not be given when required, the carrier as aforesaid shall not have or be entitled to any benefit or advantage under this Law, but shall be liable and responsible as at Common Law.

5.—*Saving of Obligation to Prove Value of Damages.*—Nothing in this Law shall be deemed to dispense with the obligation devolving upon any person claiming damages for the loss of or injury to any animal to prove the value of such animal or the amount of injury done.

[Dated 19th Aug., 1891.]



INDEX.

Abstract and Digest of Ordinances, Laws and Acts, affecting Landowners, Farmers, and Agriculturists generally.

A.	PAGE	B.	PAGE
Advances to Settlers (Financial)	214	Banks, Land. <i>See</i> "Loan Fund."	
Advisory Commissions (E.C.F.).		Bees and Bee Products, Importa-	
<i>See</i> "E.C.F.: Advisory Com-		tion of	84
missions."		Beeswax, Importation of	84
Agricultural Associations. <i>See</i>		Birds, Protected; Catching or Kill-	
"Agricultural Societies."		ing of	72
Agricultural Development. Laws		Birds, Protection of	72-75
Relating to	204, 218	Brakes on Wagons, etc.	134
Agricultural Societies, Registra-		Branding	10
tion of	224	Branding Sheep	50
Agriculture, State Aid to: Laws		Branding, Compulsory	50
Relating to	204-218	Branding, Fraudulent	85
Angora Goats. <i>See</i> "Goats, Angora."		Branding, Laws Dealing with	85-87
Animals, Carcasses of, on Public		Brands, Fraudulent Obliteration or	
Roads	4	Alteration of	85
Animals, Destruction of; Compensa-		Brands, Ostrich	86
tion for. <i>See</i> "Compensation		Brands, Sheep	55
for Destruction of Animals."		Butchers, Obligations of, in Pur-	
Animals, Destruction of Infected		chasing Stock	96
(Glanders)	43	Burr-weed, Destruction of, by Mag-	
Animals, Destruction of Infected		istrates	63, 64
(Lungsickness)	31	Burr-weed, Field Cornets to Report	
Animals, Destruction of Infected		Occurrence of	64
(Miscellaneous Diseases)	10	Burr-weed Inspectors	65
Animals, Destruction of Infected		Burr-weed: Natives' Responsibilities	63
(Rabies)	58	Burr-weed on Crown Lands	64
Animals, Diseases (General); Treat-		Burr-weed on Municipal Lands	63
ment of	2	Burr-weed on Public Roads	64
Animals, Importation of	2	Burr-weed on Private Lands	64
Animals, Movement of Diseased	42	Burr-weed on Unoccupied Land	63
Animals on Railways, Injuries to	229	Burr-weed, Penalty for Omitting to	
Animals, Sales and Glanders	42	Destroy	63
Animals, Straying of	4	Burr-weed, Warning by Field-	
Auctioneers, Obligations of, in Ne-		Cornets	64
gotiating Stock Sales	96	By-Roads. <i>See</i> "Roads."	
Auctions, Public, of Cattle. <i>See</i>			
"Cattle Sales."			

	PAGE		PAGE
C.		East Coast Fever: Advisory Com-	
Carcasses, Disposal of (Glanders) ..	44	missions ..	21
Carcasses on Public Roads	4	" " " Dipping Tanks	
Cattle-Dealing	17	(Construction) ..	18
Cattle, Destruction of	10	" " " Infected Areas ..	6, 9
Cattle, Destruction of, in Boroughs		" " " Land Leases and	
(Lungsickness)	31	Ownership of	
Cattle, Importation of	31, 38	Cattle	17
Cattle, Importation of, for Slaugh-		Slaughter Cattle ..	8
ter	40	Elephant Tusks, Export of Imma-	
Cattle, Infected; Control of	29	ture	81
Cattle, Ownership of; Disputed ..	30	Epizootic Lymphangitis	46, 47
Cattle, Ownership of; Land Leases		Epizootic Lymphangitis, Glanders	
and	17	Act Applicable to	40
Cattle, Permits for Removal of.		F.	
<i>See "Permits."</i>		Fence a Notice against Trespass ..	158
Cattle Sales and Lung-sickness		Fences along Crown Lands	151
.....	26, 27, 28	Fences along Main Roads	129
Cattle Sales and Rinderpest		Fences along Roads	149
.....	35, 36, 37, 38	Fences, Clearing Bush for	148
Cattle, "Sisa"	105	Fences, Ditch-and-Bank	149
Cattle-Stealing. <i>See "Stock Thefts."</i>		Fences, Dividing; Accidents to ..	150
Cattle, Straying of	4	" " Apportioning Cost	
Cattle Trespassing. <i>See "Trespass-</i>		of	148
<i>Cattle."</i>		" " Construction of	140
<i>Cnicus Diacantha. See "Burr-weed."</i>		" " Gates in	132
Compensation for Destruction of		" " Repairs of	150
Animals	3, 8, 18, 29, 33, 46, 60	Fences, Interference with	11
Crown Lands, Alienated. and Out-		Fences, Live	149
span	142	Fencing Agreements, Payments in	
Crown Lands and Outspan	142	Connection with	152, 153
Crown Lands, Fences along	151	Fencing, Charge upon Public Funds	
Crown Lands, Instalments on; Sus-		for	155
pension of	211	Fencing, Compulsory	12—14
Crown Lands, Squatting on	159	Fencing: Definition of "Sufficient	
D.		Fence	153
Dipping (Cattle)	6	Fencing, Entry on Land for	151
Dipping, Compulsory	19	Fencing, Government Facilities for	
Dipping Sheep	54, 55	.....	18
Dipping Stations (Sheep)	53	Fencing, Half-Cost of; Interest on	
Dipping Tanks, Government Facili-		.....	150
ties for Construction of	18	Fencing: Incidence of Rivers, etc.	
Dog Licenses. <i>See "Dog Tax."</i>		.....	148
Dox Tax	120	Fencing, Laws Relating to ..	146—150
Dog, Ownership of, Defined	121	Fencing of Public Roads, Laws Re-	
Dogs, Damage by	120	lating to	136—139
Dogs, Law Relating to	119—123	Fencing, Roses and Mauritius	
Dogs, Rabies in. <i>See "Rabies."</i>		Thorn and	149
Dogs: Regulations under Law 27,		Firebreaks	164
1875	121	"Flock," Definition of	55
Dogs, Trespass by	119, 157	Fumigation of Nurseries	66
Dogs, Unmuzzled; Destruction of		G.	
.....	58	Game, Close Season for	76
E.		Game: Employment of Natives ..	79
Ear-Marking, Laws Dealing with ..	85—87	Game in Zululand, Destructive ..	78
Ears, Mutilation of Animals'	86	Game, Killing; Restrictions on ..	76
East Coast Fever	5—21	Game on Crown Lands	78
		Game: Permit for Destruction of	
		Hares	81
		Game: Prohibited Methods of Cap-	
		ture	76
		Game Reserves	77
		Game Reserves, Permits to Hunt in	77

	PAGE
Game, Trespassing in Pursuit of ..	78
Game, Unlawful Possession of and Dealing with	78
Gates and Fences, Erection of ..	14, 15
Gates, Attendants at	15
Gates, Closing	132
Gates in Dividing Fences	132
Gates on By-Roads	129, 132
Gates on Main Roads	15
Gates on Public Roads	136
Gates on Public Roads, Upkeep of ..	137
Gates on Roads, Closing of	138
Gates, Opening of; Wrongful ..	132, 138
Glanders	41—45
Glanders and Public Roads	42
Glanders and Stabling	45
Glanders, Animals' Sales and	42
Glanders: Hotel-keepers and Stab- ling	44
Glanders, Notification of	41, 45
Goats, Angora	82, 83
Goats, Angora; Prohibition of Ex- port of	82
"Grass-Burning Act, 1895"	163
Grass-Burning and Outspans	162
Grass-Burning and Railway Lands ..	165
Grass-Burning: Firebreaks	164
Grass-Burning: Illegal Burning of Grass	162
Grass-Burning, Laws Relating to	161—166
Grass-Burning on other People's Lands	162, 164
Grass-Burning: Penalties for Care- lessness	161, 163
H.	
Hides (Game), Export Duty on ..	81
H.	
Honey and Honeycomb, Importa- tion of	84
Hotel-keepers and Stabling (Glan- ders)	44
Hunting. See "Game."	
I.	
Impounding. See "Pounds."	
Indian Labour Laws	190—197
Indian Labour. See "Labour, In- dian."	
Infected Areas, East Coast Fever ..	6
Infected Areas, Lung-sickness ..	29, 30
Infected Areas within Commonages ..	31
"Infected Flock" (Scab), Definition of	52
Inoculation of Cattle	6, 35
Inspection of Animals (Glanders) ..	43
Inspectors, Appointment of (Scab) ..	53
Interest, Claims against Natives for	201
Irrigation Laws	218, 223
Ivory. See "Elephant Tusks."	

	PAGE
L.	
Labour Agents. See "Labour, Native."	
Labour, Indian: Absence without Leave	191
" " and Masters' and Servants' Law ..	195
" " Application of Laws re, to Zululand	196
" " Certificates of Dis- charge	195
" " Cleanliness of Dwelling Places ..	194
" " Complaints by La- bourers	195
" " Employer's Neglect ..	193
" " Employment of Unlicensed In- dians	196
" " Harbouring Immi- grants	193, 194
" " Immigrants and Debt	193
" " Invalid Contracts ..	197
" " Justifiable Absence ..	191
" " Leaving Colony without License ..	193
" " Obstructing Pro- tector	193
" " Punishment for Offences	192, 193
" " Removal of Im- migrants from Colony	194
" " Unlawful Absence ..	194
Labour Laws, Indian	190—197
Labour Laws, Native	167—189
Labour, Native: Cancellation of Passes	184
" " Change of Resi- dence	182
" " Complaints by Na- tives at Court ..	177
" " Contracts 168, 171, 178 Damage to Mas- ter's Property ..	177
" " Deaths	170
" " Deductions of Fines from Wages	175
" " Deserters, Har- bouring	186
" " Desertion	174, 175
" " Identification Passes	180, 181
" " Farm Service [in Lieu of Rent 180, 183 Food and Lodging ..	169
" " Offences 171, 174, 175, 182 Passes for Women and Children ..	180

	PAGE		PAGE
Labour, Native: Pass Officers	180	Locations, Native, and Outspan . .	142
" " Punishment of		Locust Areas	60
Boys by Whipping	174	Locust Destruction: Cutting of	
" " Refusal by Master		Grass, etc.	61
to Supply Food	178	Locust Destruction: Neglect to	
" " Registration of		Comply with Orders	60
Crimes	182	Locust Officers and Trespassing . .	61
" " Service after Im-		Locust Officers, Appointment of . .	60
prisonment	175	Locust Officers' Powers, Chief . .	60
" " Sickness and Acci-		Locusts	59—62
dents	170	Locusts, Driving, to other Property	61
" " "Tout," Definition		Locusts: Land Owners' and Occu-	
of	184	piers' Duties	60
" " Touting and Age		Lungsickness	21—34
of Native	187	Lungsickness, Cattle Sales and . .	26
" " Touting: Enticing		Lungsickness Inspectors	23
Servants	185	Lungsickness Licenses	24
" " Touting, Entry		Lungsickness, Notice of Outbreaks	
upon Land for	185	of	24
" " Touting for Ser-			
vice outside Natal	187	M.	
" " Touting: Illegal		Master and Servants' (Native) Act	167
Contracts	188	Muzzling (Rabies)	58
" " Touting, Laws Re-			
lating to	184—189	N.	
" " Touting: Registra-		Native Beer Drinks	198
tion of Contracts	188	Native Gatherings	198
" " Touts' Licenses	185, 187	Native Labour. <i>See</i> "Labour."	
" " Unlawful Detain-		Native Reserves and Outspan	142
ing of Servants'		Natives and Liquid Documents on	
Cattle	178	Debt	203
" " Wages	170	Natives, Loans to	201
" " Wages Withhold-		Natives, Miscellaneous Laws Relat-	
ing of	178	ing to	198—203
Land Bank. <i>See</i> "Loan Fund."		Natives on Roads	135
Land, Compulsory Acquisition of . .	226	Notification of Diseases: Glanders . .	41—45
Land for Public Purposes, Acquire-		Notification of Diseases: Scab	49
ment of	226—229	Noxious Plants	62—66
Land for Railways, Acquisition of . .	227	Nurseries, Fumigation of	68
Land Leases and Ownership of . .		Nurseries, Inspection of	64
Cattle	17	Nurseries, Registration of	64
Lands, Crown, and Outspan	142		
Lands, Crown; Fences along	151	O.	
Lands, Crown; Squatting on	159	Orchards, Inspection of	67
Land Settlement, Laws Relating		Ostriches and Ostrich Eggs, Export	
to	204—218	of	83
Land Settlement: Suspension of		Ostriches, Branding	87
Payment of Instalments on		Ostriches Constituted Domestic	
Crown Lands	211	Birds	86
Lands, Railway, and Grass-Burning	165	Outspan, Alienated Crown Lands	
Lands, Unalienated Crown, and		and	142
Outspan	142	Outspan, Crown Lands and	142
Leases, Crown; Cession Fees upon		"Outspan," Definition of	142
Unregistered	218	Outspan, Freeing of Farms from	
Licenses, Lungsickness. <i>See</i> "Lung-		General Servitude of	140
sickness Licenses."		Outspan, General Servitude of . .	141
Loan Fund, Law Relating to	213—218	Outspan, Native Reserves and . .	142
Loans for Dipping Tanks and Fenc-		Outspan Places and Grass-Burning	
ing	18	Law	142
Loans to Natives	201	Outspan, Road Parties and	141
Loans to Settlers	214	Outspans, Acquisition of Lands for	143
		Outspans, Creation of	139
		Outspans, Defining and Registering	
		of	140

	PAGE
Outspans, Fencing of	143
Outspans, Grass-Burning and	162
Outspans in Victoria, Durban, and Alexandra Counties	140
Outspans, Irregular Notice Boards .	141
Outspans, Laws Relating to	139—144
Outspans on Sub-divided and Trans- ferred Farms	140
Ownership of Cattle, Disputed . .	30
P.	
Permits for Cattle-Dealing	17
Permits for Removal of Cattle . . .	16
Pigs, Impounding of	118
Plant Diseases and Pests	66 70
Plant Diseases: Board of Advice . .	67
Plant Diseases Inspectors	67
Plant Diseases Inspectors and Tres- passing	69
Plant Diseases Inspectors, Powers of	68
Plants, Destruction of, by Board of Advice	67
Plants, Introduction of, into Natal .	67
Plants, Sale of	68
Plants, Special Treatment of, for Diseases	68
Pound Fees	111, 114
Poundkeepers, Appointment and Removal of	108
Poundkeepers' Duties	111, 112
Pound Laws	107 118
Pounds: Compensation for Dam- ages by Stock Trespassing	109, 112
Pounds, Diseased Animals in	112
Pounds, Erection of	111
Pounds, Establishment of	108
Pounds: Illegal Impounding	117
Pounds, Glanders and	42
Pounds, Lungsick Cattle in	30
Pounds: Impounding of Pigs	118
Pounds: Impounding of Stock with- out Pass	91, 92
Pounds: Impounding of Trespass- ing Stock	108
Pounds: Impounding of Unbranded Sheep	50
Pounds: Malicious Impounding . .	93
Pounds: Obligations of Persons Impounding	109, 110
Pounds: Resistance to Impounding of Stock	93
Pounds: Sales of Stock	114, 116
Pounds: Stock in Unproclaimed Townships	109
Pounds: Stock too Wild to be Im- pounded	115
Pounds: Trespass by Stallions, Bulls, and Rams	116
Protection of Game	75—82
Public Works, Punishment for Damage to	126

	PAGE
Q.	
Quarantine (Animals — General)	2, 5, 6, 10
Quarantine (Epizootic Lymphau- gitis)	46
Quarantine (Glanders)	43, 44
Quarantine (Lungsickness)	25
Quarantine (Nurseries and Or- chards)	68
Quarantine (Rinderpest)	34
R.	
Rabid Dogs, Destruction of	58
Rabies	57—59
Rabies: Muzzling Dogs	58
Railway Construction, Compensury for Injury in	228
Railway Lands and Grass-Burning .	165
Railways, Animals on; Injuries to .	229
Railways, Extension of; Surveys for	228
Rinderpest	34—38
Road Boards, Constitution of . . .	128
Road Boards, Jurisdiction and Powers of	128
Road Boards, Laws Relating to . .	128—133
Road Disputes: Appeals to Sup- reme Court	130
Road Disputes: Finality of Board's Decision	130
Road Disputes: Powers of Magis- trates	130
Road Officers, Obstruction of . . .	126
Road Parties' Rights	126
Roads: Alteration of By-Roads . .	129
Roads, Animals with Glanders on .	42
Roads, Fences along	149
Roads: Gates on By-Roads	129—132
Roads, Gates on Public	136
Roads, Gates on Public; Upkeep of .	137
Roads, Gates on Main	15
Roads, Inspection of, by Road Boards	130
Roads, Laying off	130
Roads, Laws Relating to	125—139
Roads, Lungsick Cattle on	28
Roads, Main; Fences along	129
Roads, Main; Materials for	125
Roads, Main; Suspension of Traffic on	133
Roads: Maintenance of By-Roads .	129
Roads, Main Trunk; Creation, etc., of	137
Roads, Main; Width of	125
Roads, Natives on	135
Roads: Penalty for Closing By- Roads	131
Roads, Public; Fences over	152
Roads, Public; Width of	127
Roads, Public; Width of Unfenced .	142
Roads, Stoppage of Existing . . .	131
Roads, Width and Direction of . .	129

	PAGE		PAGE
S.		Stock Thefts: Harboursing Suspect-	
Scab	45, 47	ed Persons	101
Scab Inspectors, Appointment of . .	48	" " Liability of Parents	
Scab, Movement of Sheep Infected		or Guardians	104
with or Dressed for	52	" " Malicious Search	98
Scab, Notification of	49	" " Powers of Search	105
Season, Close (for Game)	76	" " Punishments	102
Settlers, Financial Advances to . .	214	" " Receiving Stolen	
Sheep, Branding	54	Stock	104
Sheep Brands. <i>See</i> "Brands."		" " Responsibilities of	
Sheep, Destruction of Infected		Native Kraals	97, 99
(Scab)	50	Stock Trespassing. <i>See</i> "Trespass."	
Sheep, Dipping	54, 55	Straying Animals (Glanders)	45
Sheep, Introduction of, into Natal			
.	55, 54, 57	T.	
Sheep, Movement of Branded and		Testing for Glanders	43
Dipped	54	Ticks, Wilful Conveyance of	16
Sheep, Movement of, Infected with		Touts. <i>See</i> "Labour."	
or Dressed for Scab	52	Traffic in Dangerous Places, Regu-	
Sheep, Movement of; Winter	54	lations for	135
Sheep, Possession of; Notification		Traffic on Main Roads, Suspension	
<i>re</i>	49	of	133
Sheep, Sale of (Scab)	52	Traffic, Regulation of; Laws Relat-	
Sheep, Unbranded; Impounding of .	50	ing to	132-135
"Sisa" Cattle	105	Traffic Regulations	134
Spoor. <i>See</i> "Stock Thefts."		Trespass by Stock, Compensation	
Squatters, Native; Ejection of . .	159	for Damages through	112
Squatting on Crown Lands	159	Trespass: Cattle	10, 25
Squatting, Laws Relating to . .	158-160	Trespass: Destruction of Cattle . .	25, 28
Squatting: Return of Native Ten-		Trespass: Dogs	119, 157
ants	159	Trespassers, Seizure of Produce	
Squatting, Unlicensed	158	Found upon	157
Stabling, Glanders and	45	Trespass, Fence a Notice against . .	158
Stabling, Hotel-keepers and (Glan-		Trespassing and Theft	157
ders)	44	Trespassing in Pursuit of Game . .	78
State Aid to Agriculture, Laws		Trespassing, Locust Officers and . .	61
Relating to	204-218	Trespassing, Plant Diseases Inspec-	
Stock, Purchase of; Butchers' and		tors and	69
Auctioneers' Obligations	96	Trespass, Laws Relating to . .	156-158
Stock, Purchase of, from Natives		Trespass: Poultry and Pigeons . .	117
and Asiatics	95	Trespass: Stallions, Bulls, and	
Stock, Purchase of; Liability of		Rams	116
Receiver in Fraudulent Sales . .	96	Trespass, Wilful; Definition of . .	150
Stock, Purchase of, without Pass . .	96	Tuberculosis	38-41
Stock, Removal of; Exemptions		Tusks, Elephant. <i>See</i> "Elephant	
from Arrest or Detention . .	94	Tusks."	
Stock, Removal of; False Passes			
for	94	V.	
Stock, Removal of; Passes for . .	90, 91	Vehicles on Main Roads. <i>See</i>	
Stock Sales: Butchers' and Auc-		"Traffic."	
tioneers' Obligations	96	Vehicles, Owner's Name on	134
Stock, Seizure of (Legal), by Na-		Veterinary Officers, Obstruction of	24
tives	93		
Stock, Seizure of; Wrongful	93	W.	
Stock Thefts	89-107	Wagon-Drivers, Responsibilities of	135
Stock Thefts: Arrest without War-		Wagons, Owner's Name on	134
rant	105		
" " Compensation	103	X.	
" " Evidence	101, 104	Xanthium Spinosum. <i>See</i> "Burr-	
" " Fraudulent Creation		weed."	
of Spoor	98	Xanthium Strumarium. <i>See</i> "Burr-	
		weed."	

Abstract and Digest
OF
ORDINANCES, LAWS AND ACTS
AFFECTING
LANDOWNERS, FARMERS,
AND
AGRICULTURISTS GENERALLY.

COMPILED AND EDITED BY H. J. CHOLES,
Editor, "Natal Agricultural Journal."

INTRODUCTION.

PRACTICALLY all our necessities of life spring, directly or indirectly, from the soil, and by far the greater part of them through the instrumentality of the farmer, planter, and forester. Where other groups of workers in the State fashion and improve and so increase the marketable value of commodities by rendering them more conformable to the wants of mankind, farmers go to the permanent* origin of nearly all wealth,** namely, the soil, and force it by various arts to yield up its primitive substances, nitrogen (obtained, that is, with the help of the soil, from the atmosphere), phosphoric acid, potash, and other elements, in a wonderful variety of forms consumable by mankind. From the very nature of their calling, indeed, farmers, pastoral, agricultural and tropical, and forest workers, have become constituted a body apart. Standing thus isolated, and considering their calling as the permanent creators of

* As distinguished from the transitory nature of mineral wealth.

** The products of the sea must be excluded.

new wealth, it is not wonderful that a body of laws should have sprung up for the protection of their interests as farmers, for assisting them in their vocation, and for encouraging generally the settlement of the land. In Natal, during the three-score years or more of her existence under civilised rule, quite a large body of laws has come into being, laws both permissive and obligatory, framed to direct our farming industries along right lines and to furnish that measure of protection of individual interests without which progress is impossible.

In looking through these laws we find that they fall naturally into several large groups, according as they are concerned respectively with the protection of property, with the improvement of property, with the furnishing of assistance by the State to farmers, with the regulating of the relations between the European and the coloured and black races, and so on; but from a practical point of view their sub-division into a number of smaller groups renders them more capable of assimilation and affords a readier examination of them as a whole. The grouping which I have chosen for the laws we have in Natal is, of course, to some extent arbitrary, and admits of much better arrangement at the hands of a more capable compiler than myself, but I think the arrangement I have adopted will be found to answer the practical purposes in view, namely, the ready assimilation of the various laws and a ready reference to them as occasion requires. These various divisions are:—I. Diseases and Pests; II. Protection of Animals and Animal Industries (including Game Laws); III. Branding and Ear-marking; IV., Stock Thefts and Pounds; V. Laws Relating to Dogs; VI. Roads, Traffic, and Outspans; VII. Fencing, Trespass, and Squatting; VIII. Grass Burning; IX. Native Labour Laws; X. Indian Labour Laws; XI. Natives—Miscellaneous Matters; XII. State Aid to Agriculture, and Land Settlement; XIII. Irrigation Laws; and XIV. Miscellaneous. Some of these divisions naturally contain a larger number of laws than others, and it is a matter of no surprise that the first of these divisions comprises quite 25 per cent. of the total number of laws relating to farming. Rinderpest, lung-sickness, tuberculosis, East Coast Fever, glanders, epizootic lymphangitis, scab, and even rabies: all have called at various times for legislation; and though, one is thankful to realise, all these laws are not in active operation at the present time, still it is satisfactory to know that we have on our Statute Book measures which will assist immediately in controlling outbreaks of any of those diseases as occasion may require in the future. Of the other groups into which our laws may be divided, none perhaps calls for special attention in an introductory note such as this, with the exception of the group of laws relating to Indian immigration. In the list of laws which have been drawn up, I have included thirteen laws on this subject, and still I have not exhausted the entire number on our Statute Book (my reason for

omitting several being that they could not be regarded as of general interest). Most of these laws are, of course, of the nature of amendments of the earlier ones, but the mere fact of their being amending Acts indicates the attention which our legislators have been obliged to bestow on this important economic feature of our farming. The division of laws dealing with diseases and pests is, as I have remarked, a long one, but it consists of a number of sub-divisions, each dealing with a particular disease or pest, whilst the division relating to Indian immigration stands as one undivided subject; and this subject enjoys the distinction of having had bestowed upon it, I will not say the most attention, but at any rate the most frequent attention of our legislators in the past.

Under these fourteen categories, then, we can conveniently deal with the unrepealed Ordinances, Laws, and Acts which have been placed upon our Statute Book since 1850 and which are of sufficient general interest to make them worthy of comment; and these fourteen groups I have made the subject of as many chapters in the Abstract which follows.

In preparing this Abstract I have given further acquiescence to the wish expressed some five years ago by the Natal Agricultural Union to the effect that an abstract should be published of all the Natal laws relating to farming or of interest to farmers and landowners. In December, 1905, the Secretary to the Minister of Agriculture published a short abstract of the laws up to that time; and I have now, as five years have elapsed since that abstract was published, and as the entry of Natal into Union seems to offer a fitting opportunity, thought that a revision up to the present year would be welcome to the farmers of this Province. Whilst, however, I have taken the previous abstract as a basis upon which to work, I have gone further and have considerably widened the ground covered by that work, and adopted a different method of arrangement. As I have indicated above, I have dealt with these laws under fourteen chapters; and I have also at the beginning of each chapter, prepared a digest of the laws included therein in order that anyone who may seek to know what legislation is in force regarding any particular subject, may in a very brief space acquaint himself of the nature of that legislation without having to undergo the fatigue of reading through many pages of the laws themselves. I would wish it to be understood, however, that these digests do not pretend to do anything more than offer a general idea of the laws with which they deal, and that they are not couched in any degree in the language of the laws themselves; so that if definite information is required on any particular point the laws themselves should be referred to. To assist in this I have prepared an extensive index, which will be found at the end of the Abstract, and which will enable any particular subject or point to be turned up with ease. I have also prepared a detailed list of contents, which will facilitate the

turning up of the laws of any desired group; and a chronological list of laws will also be found following the contents list.

All the laws as printed stand as amended, and I have indicated as footnotes, in the case of such amendments, the laws which have effected the changes. I have also endeavoured to give, by means of footnotes, as complete cross-references between the different laws as possible; and at the end of each chapter will be found details of references in other laws to the subject of the chapter. In the form of footnotes, too, I have referred to cases of interest which have come before the Natal courts in connection with the various laws with which this Abstract deals, for which references I must express my indebtedness to Hitchins' *Statutes of Natal*.

CONTENTS.

	Page
CHRONOLOGICAL LIST OF LAWS	—
CHAPTER I.: DISEASES AND PESTS	1
I.—General	1
II.—East Coast Fever	5
III.—Lungsickness	21
IV.—Rinderpest	34
V.—Tuberculosis	38
VI.—Glanders	41
VII.—Epizootic Lymphangitis	46
VIII.—Scab	47
IX.—Rabies	57
X.—Locusts	59
XI.—Noxious Plants	62
XII.—Plant Diseases and Pests	66
CHAPTER II.: PROTECTION OF ANIMALS AND ANIMAL INDUSTRIES (INCLUDING GAME LAWS)	71
I.—Wild Birds	72
II.—Angora Goats	82
III.—Ostriches	83
IV.—Miscellaneous Animal Products	83
CHAPTER III.: BRANDING AND EAR-MARKING	85
CHAPTER IV.: STOCK THEFTS AND POUNDS	88
I.—Stock Thefts	89
II.—Pound Laws	107
CHAPTER V.: LAWS RELATING TO DOGS	119
CHAPTER VI.: ROADS, TRAFFIC, AND OUTSPANS	124
I.—Roads and Road Boards	125
II.—Regulation of Traffic	133
III.—Fencing of Public Roads	136
IV.—Outspans	139
CHAPTER VII.: FENCING, TRESPASS, AND SQUATTING	14
I.—Fencing Laws	146
II.—Trespass	156
III.—Squatting	158
CHAPTER VIII.: GRASS BURNING	161
CHAPTER IX.: NATIVE LABOUR LAWS	167
I.—Master and Servant... ..	167
II.—Touts and Touting	184
CHAPTER X.—INDIAN LABOUR LAWS	190
CHAPTER XI.—NATIVES—MISCELLANEOUS MATTERS	198
I.—Native Gatherings	198
II.—Loans to Natives	201
CHAPTER XII.: STATE AID TO AGRICULTURE, AND LAND SETTLEMENT	204
I.—Agricultural Development (General)	205
II.—Loan Fund... ..	213
III.—Miscellaneous	218
CHAPTER XIII.: IRRIGATION LAWS	219
CHAPTER XIV.: MISCELLANEOUS	224
I.—Agricultural Societies	224
II.—Acquirement of Land for Public Purposes	2
III.—Injuries to Animals on Railways	

LIST OF LAWS

RELATING TO

LAND OCCUPATION, FARMING, ETC.

INCLUDED OR REFERRED TO IN THE PRESENT ABSTRACT*

Arranged in Chronological Order.

No. of Law.	Subject.	Chapter and Section in which dealt with.
Ord. No. 2, 1855	Squatting	VII., iti.*
Law No. 13, 1865	Traffic	VI., ii.
21, 1865	Grass Burning	VIII.
13, 1866	Stock Diseases (General)	I., i.
9, 1870	Outspans	VI., iv.
14, 1872	"	VI., iv.
13, 1874	Trespass	VII., ii.
29, 1874	Stock Diseases (General)	I., i.
33, 1874	Traffic	VI., ii.
38, 1874	Xanthium Spinosum	I., xi.
19, 1875	Roads	VI., i.
27, 1875	Dogs	V.
2, 1880	Railways	XIV., ii.
3, 1880	"	XIV., ii.
22, 1882	Branding and Ear-marking	III.
23, 1883	Agricultural Societies	XIV., i.
41, 1884	"Squatters' Rent Law"	VII., iii.
26, 1887	Irrigation	XIII.
30, 1887	Fencing	VII., i.
36, 1887	"	VII., i.
48, 1887	Scab	I., viii.
13, 1889	Ear-marking	III.
23, 1889	Fencing	VII., i.
26, 1890	"	VII., i.
16, 1891	Game	II., v.
21, 1891	Injuries to Animals on Railways, etc.	XIV., iii.
28, 1891	Indian Immigration	X.
9, 1893	Irrigation	XIII.
Act No. 24, 1894	Scab	I., viii.
29, 1894	Game	II., v.
38, 1894	Fencing	VII., i.
40, 1894	Animal Diseases	I., i.
17, 1895	Master and Servant (Native)	IX., i.
21, 1895	Indian Immigration	X.
31, 1895	Scab	I., viii.
15, 1896	Grass Burning	VIII.
33, 1896	Acquisition of Land for Outspans	VI., iv.
3, 1897	Wild Birds Protection	II., i.
6, 1897	Cattle Diseases	I., i.
12, 1897	Trespass	VII., ii.
14, 1897	Fencing	VII., i.
28, 1897	Indian Immigration	X.
30, 1897	"	X.
5, 1898	Lungsickness	I., iii.
19, 1898	Natives	XI., i.
27, 1898	Indian Immigration	X.
40, 1898	Glanders	I., vi.
42, 1898	Rinderpest	I., iv.
1, 1899	Pounds	IV., ii.
10, 1899	Stock Thefts	IV., i.
16, 1899	Land for Railways	XIV., ii.
25, 1899	Glanders	I., vi.

*A subject index will be found at the end of the Abstract.

No. of Law.	Subject.	Chapter and Section in which dealt with.
Act No. 27, 1899	Trespass	V.
30, 1899	Tuberculosis	I., v.
35, 1899	Anima Diseases	I., i.
1, 1900	Master and Servant (Native)	IX., i.
8, 1901	Indian Immigration	X.
20, 1901	"	X.
35, 1901	Xanthium Strumarium	I., xi.
40, 1901	Road Boards	VI., I.
46, 1906	Ostriches	II., iii.
41, 1901	Touts	IX., ii.
40, 1901	Indian Immigration	X.
50, 1901	Master and Servant (Native)	X., i.
9, 1902	"	IX., i.
18, 1902	Fencing of Public Roads	VI., iii.
27, 1903	Grass Burning	VIII.
28, 1903	Lungsickness	I., iii.
29, 1903	Rinderpest	I., iv.
32, 1903	Rabies	I., ix
3, 1904	East Coast Fever	I., ii
12, 1904	Master and Servant (Native)	IX., i.
13, 1904	Cnicus diacantha	I., xl
40, 1904	Wild Birds Protection	II., i.
44, 1904	Locust Extermination	I., x.
45, 1904	Agricultural Development	XII., i.
3, 1905	Plant Diseases	I., xii.
12, 1905	Grass Burning	VIII.
39, 1905	Pounds	IV., ii.
41, 1905	Indian Immigration	X.
42, 1905	Stock Thefts	IV., i.
8, 1906	Indian Immigration	X.
11, 1906	Game	II., v.
19, 1906	Scab	I., viii.
23, 1906	Acquirement of Land for Public Purposes	XIV., ii.
46, 1906	Epizootic Lymphangitis	I., vii.
52, 1906	Fencing	VII., I.
54, 1906	East Coast Fever	I., ii.
3, 1907	Indian Immigration	X.
6, 1907	East Coast Fever (Fencing)	I., ii
8, 1907	East Coast Fever	I., ii.
14, 1907	Tuberculosis	I., v.
15, 1907	Lungsickness	I., iii.
27, 1907	Financial Assistance to Settlers... ..	XII., ii.
28, 1907	Agricultural Development	XII., i
29, 1907	Ostrich Export	II., iii.
1, 1908	Touts	IX., ii.
12, 1908	Master and Servant (Native)	IX., i
27, 1908	Financial Assistance to Settlers	XII., ii.
29, 1908	Angora Export	II., ii.
31, 1908	Crown Land Leases	XII., iii.
32, 1908	East Coast Fever	I., ii
41, 1908	Loans to Natives	XI., ii.
15, 1909	Exotic Animals, etc (Import of)	II., iv.
24, 1909	Financial Assistance to Settlers	XII., ii.
33, 1909	Export of Elephant Tusks, etc... ..	II., iv.
11, 1910	Indian Immigration	X
18, 1910	Game	II., v.
19, 1910	Indian Immigration	X.
20, 1910	Dipping Tanks and Fencing	I., ii.
23, 1910	Instalments on Alienated Lands... ..	XII., i.
26, 1910	Tick Bird... ..	II., i.
27, 1910	Land Settlement	XII., i.

TO OUR READERS.

With this issue the *Natal Agricultural Journal* ceases to exist. With the establishment of Union, it has become necessary to incorporate the Cape, Transvaal, and Natal Agricultural Journals, and to issue one Agricultural Journal for the Union, the headquarters of which will be at Pretoria. To all who have so cordially supported us in the past, both with contributions and otherwise, we take this opportunity of tendering our thanks and appreciation for the assistance which they have rendered us. We may state that the Agricultural Journal of the Union will be issued monthly, and arrangements are being made whereby subscribers to the late Provincial Journals will receive the Union Journal, the lists of subscribers being transferred from the Provincial Journals.

With this number is issued an index for the volume of the *Journal* just closed.

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